Persistent Teens Pull Off Coup

By Jeffry Beeler
CW Staff

HAYWARD, Calif. — Overcoming almost insurmountable obstacles, two teenagers scored a minor mathematical coup recently when they found the largest known prime number with the help of a mainframe and advisors at California State University here.

Eighteen-year-olds Laura Nickel and Curt Noll uncovered the number, $2^{21,701}-1$, on Oct. 30 following a tempestuous three-year search that included some 440 hours of computer time on the school's Control Data Corp. Cyber 174.

With their find, Nickel and Noll eclipsed a record set in 1971 when Dr. Bryant Tuckerman of IBM's Yorktown Heights, N.Y., research center found the largest previously known prime number, $2^{19,937}-1$. Tuckerman phoned his congratulations to the pair about three weeks ago after he and mathematician Dr. D.H. Lehmer of the University of California at Berkeley independently confirmed the primality of the Nickel-Noll find.

Throughout their long search for the 6,533-digit number, the two youths battled parental and administrative objections that frequently overshadowed the intellectual challenges of their enterprise. Nickel's parents particularly opposed the project because it forced their daughter — a Hayward High School dropout who has attended Whittier College in southern California — to spend long periods away from home.

She was a bit wild, confessed Cal State math lecturer Dan Jurca, who aided the pair by providing research material and arranging for them to use the school's

(Continued on Page 6)

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
Weekly Newspaper Second-class postage paid at Boston, Mass., and additional mailing offices ©1978 by CW Communications Inc
Vol. XII, No. 48 November 27, 1978 $1.00 a copy $25 year

Itel Microcode Lets ECPS Run on 370/145

By Don Leavitt
CW Staff

SAN FRANCISCO — Through a substantial reworking of the microcode used on IBM's original 370/145, Itel Corp. has made the Extended Control-Program Support (ECPS) built into OS/VS1 available to users of that CPU, an Itel spokesman said here last week.

With the change, Model 145 users can gain performance improvements of 12% to 15% compared with operations under unenhanced VS1, he said.

The spokesman said a beta test site that runs its system 24 hours a day, seven days a week — so they really beat it good and hard — had seen useful problem program time rise from 60% to 72%. Since the shop normally runs at 100% utilization, the boost in user time had to be a reflection of reduced supervisor time, he asserted.

Introduced by IBM when it announced the 370/148, ECPS has been described as a hardware assist since it moves part of VS1 into microcode.

At the ECPS announcement, IBM said the facility could not be made available on the 145 since that CPU did not have enough microcode space or capability, according to Itel.

Currently, however, ECPS is available not only on the 148 but for VS1 users running on the 135-3, the 138 or the 145-3. It may be used if VS1 is running native or under the Virtual Machine facility (VM/370), according to an IBM manual.

Itel said it was convinced the support could be adapted to the original 370/145 so it set its engineers to work to determine what ECPS really did and how it could be fit into the space available on the 145.

They succeeded, the spokesman said, and the ECPS facilities can be utilized by any user after a re-gen of the system. The generation parameters have to specify a desire to use ECPS and, at Initial Microcode Program Load (IMPL), the Itel microcode is loaded from a magnetic tape.

While the vendor is ready to distribute the microcode generally on the basis of the single beta test site's experience, the Itel spokesman also said the company is looking for more test sites.

He apparently does not see the offering as a long-term solution to the typical user. Instead, he said it would probably be of the most benefit to folks with a 145 that is just about out of gas. With Itel's ECPS in place, these users can limp along for another couple of months.

ECPS provides no functional benefit, he acknowledged, adding that it does not, for example, support any peripherals that aren't available under non-ECPS-supported VS1. But it does provide the performance boost it was designed to give, he reiterated.

The microcode will be generally available after the first of the year. It will cost from $500/mo to $700/mo, depending on the term of the licensing agreement, the spokesman said from One Embarcadero Center, San Francisco, Calif. 94111.

The V-8600 mainframes unveiled by NCR Corp. last week — its largest CPUs yet — feature 64K-bit memory chip technology.

NCR's Biggest CPUs Yet Feature ECL, 64K-Bit Chips

By Howard A. Karten
CW Staff

DAYTON, Ohio — NCR Corp. announced its largest systems ever last week with the introduction of two mainframes featuring emitter-coupled logic (ECL), 64K-bit memory chip technology and gate speeds of 750 picosec.

Apparently aiming to compete with IBM's 3032 and 3033 processors, NCR said it will begin shipping the V-8650 and the V-8670 in the fourth quarter of 1980.

The smaller system, available with memory sizes of 4M, 6M and 8M bytes, gives 10% more throughput than the IBM 3032, according to a spokesman. The larger V-8670, available with 4M, 6M, 8M, 12M or 16M bytes of storage, gives 15% greater performance than the 3033, he said.

However, it is NCR policy to state these figures in terms of power or throughput, and they are not necessarily indicative of the units' speeds, the spokesman pointed out.

NCR claimed several technological advances for the systems in addition to those of circuitry. These include a high-speed cache memory, bus architecture, multiple virtual machine capabilities and a pipeline design.

(Continued on Page 8)

ACS to Relieve Host CPU Of Some Net Tasks: Bell

By Ronald A. Frank
CW Staff

WASHINGTON, D.C. — Future users of AT&T's Advanced Communications Service (ACS) will find that certain functions now performed in host mainframes will be moved into the network.

This was one of the Bell System responses to a series of questions about ACS that had been posed by the Federal Communications Commission (FCC) in an attempt to get more details about the proposed AT&T network offering [CW, July 24].

ACS will allow a decoupling of the originating and receiving stations in a message transmission, resulting in independence of terminals and hosts, AT&T said.

"This decoupling reduces the terminal communications support burden experienced by hosts in many user net-

(Continued on Page 4)

A CW Special Report on Data Communications Networks appears after the In Depth section, which follows Page 60.

Police Comb Through Printouts, Find Car That Hit Fellow Officer

By Tim Scannell
CW Staff

BOSTON — Aided by a Registry of Motor Vehicles computer, police here have located the car that struck and seriously injured Metropolitan District Commission (MDC) patrolman Harold MacGilvray in a recent hit-and-run accident. The vehicle's driver is still unidentified.

MDC detectives discovered the damaged aqua blue 1968 Chevrolet sedan after a massive two-day, round-the-clock investigation by more than 300 MDC patrolmen. MDC police officials combed through stacks of printouts containing approximately 16,000 possibilities that matched the description supplied by MacGilvray's partner, an eyewitness at the scene.

Officials narrowed the list to about 6,000 cars by eliminating various color combinations and separated the remaining printouts according to different geographic areas. More than 300 MDC policemen then worked both on- and off-duty to locate and examine every car on the final list.

The vehicle was found in nearby Weymouth and identified by matching the car's dented right-front side with a 4 in.-long piece of chrome left at the accident's scene and some paint flecks taken from MacGilvray's uniform.

'Matter of Seconds'

MacGilvray was hit exactly two weeks ago as he and his partner were questioning another driver in the breakdown lane of Boston's Southeast Expressway. The unidentified driver of the Chevrolet was allegedly traveling in the same lane at about 60 miles per hour and hit MacGilvray when he swerved to avoid the stopped car.

The force of the impact lifted the patrolman out of his shoes and tossed him more than 25 feet into the air, Henry Scully, MacGilvray's partner, explained. Scully witnessed the incident as he stood on the other side of the stopped automobile. "In a matter of seconds [MacGilvray] was in the air and the car gone," he recalled.

Extensive Surgery

The driver of the stopped car chased the speeding automobile and provided police with a vague description of the car's make and color.

MacGilvray was rushed to the Boston City Hospital for emergency treatment and later transferred to the Boston University Medical Center for extensive surgery.

Doctors toiled for 13 hours reattaching the patrolman's aorta, which had been nearly ripped from his heart, repairing a punctured colon and liver, setting two leg bones and rebuilding the circulatory system in the officer's lower right leg.

Doctors are optimistic about MacGilvray's survival, although his name was still on the hospital's critical list at press time.

Printouts Aid Search

This was the first time the MDC ever performed an investigation of such magnitude, MDC spokesman Frank Muelo said. "We were able to find the car through a lot of legwork and good investigatory techniques," he commented. "But we probably would still be looking door-to-door if we did not have the printouts from the registry."

MDC and other police agencies usually access the Registry of Motor Vehicles Control Data Corp. 3300 system via a computer located at the Massachusetts State Police headquarters. The registry maintains between 3.5 million and 5.5 million "valid" automobile files which are indexed according to the vehicles' identification and registration numbers, according to Robert Capasso, deputy registrar. However, in the MDC's case there was nothing to go on except the class of the vehicle involved in the accident.

Normally this type of search would first have to be cleared through the registry's Special Investigation Section and then the registrar before being submitted to the computer room staff. "But in this particular case, we stopped the shop and put [the request] right through," Capasso noted.

The registry's entire file was matched against the information supplied by MacGilvray's partner and the motorist who gave chase, producing several thousand suspected cars and ultimately leading to the correct vehicle.

Case Not Closed

The investigation, however, is far from over, Muelo observed. Although the owner of the Chevrolet has been identified and a suspect has confessed to driving the car at least two hours before the incident, the guilty driver is presently still at large. "We're not going to rush into it; we're going through it slow and making sure the process is complete," Muelo said.

"When a brother officer is hurt is hurt or something like this happens, everybody pools together," Muelo stressed. "You're fighting the court system; you're fighting a lot of different things as a police officer; you're more or less against the world. So you try to hold each other together."

On the Inside This Week

NEWS

Virginia Today Finishing Canvass in Senate Race . . . 4
ACM to Honor Weiss at Annual Meeting. 6
Disciples of Bacchus Automate Wine-Rating Job . . . 7
Use of Encryption on Fedwire Under Study 8
DP Failure Holds Up Traffic at Three Airports 9
Batch System Consolidates Patient Blood Data. . . . 10
User Sues DEC for 'Fatally Defective' PDP-11 11
Air Force Tests Workspace With 'Combiman' 12
Micro Field Booming, IBM Witness Testifies 13
Service Feeds News on Laws to Multistate Firms. . . 14
Developers of Promis Win Rockefeller Award 15
Better Communication on Data Flow Urged. 16
Bartering Service Works Like Charge Account 17

IN DEPTH

Project Management . . . . Follows Page 60

EDITORIAL

Editorial: The Untapped Resource 18
Human Connection: AT&T and Marketing 19
Taylor Report: Security Tasks Must Be Delegated. . 19
Executives Taking Stock of Future DP Situation . . . 19

SOFTWARE & SERVICES

Package Tunes Retailer's DP Operation. 23
CP-77 Extends Vortex II, Boosts V77 Mini 24
'SAS,' 'Tell-A-Graf' Tie Adds Graphics to Analysis. . 25
Bollinger Claims Blasted as Nearly Irresponsible . . 26
'BDRaid' Backs IMS, CICS 30
CPE Effort Eases Manufacturer's DP Functions. . . . 31
Users Can Work With Vsam Through 'Symdata' . . . 32

COMMUNICATIONS

Nets to Offer Technology Mix, Doll Says. 33
Terminals Put Order at Control Division Site 34
Emulators Tie Harris 8000 to Three Firms' CPUs . . . 40
'Networking' Has Many Meanings, One Goal 41
Sweda Offers Restaurant ECRs 42

SYSTEMS & PERIPHERALS

Bank, Employees Cash in via Key-to-Disk 43
Printer Extends Chaintrain Line 45
User Endures Eight-Month Switch to DDP 49
System Helps Keep Store Shelves Well-Stocked. . . 50

MINIWORLD

User 'Misled' Regarding Upgrade Costs. 61
Fairchild Host Eases Product Tests 62
Ship Designer On Course With Mini System 67
Distributor Cuts Surplus Stock by $100,000. 70

MICROCOMPUTING

Portable Unit Offers Speech to the Mute 71
8002 Users Offered Fortran-80 72

COMPUTER INDUSTRY

CFI Suit Against Decimus Still Stands 73
Act Expected to Bring Capital to Tech Firms 73
U.S., IBM Trying 'Narratives' to Speed Trial 74
Japan's General-Use CPUs Seen Tripling by '85 . . . 78
CDC Becomes Fifth DP Firm With Moscow Office . . 80
Lessor Asks: Will Terminal Leasing Firms Last? . . . 81

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
TM reg U.S Pat Off.

EDITORIAL

Editor	E Drake Lundell Jr
Deputy Editor	Ronald A Frank
Managing Editor	Nancy French
Associate Editor	Donald Leavitt
Washington/ Correspondent	Jake Kirchner
Staff Writers	Jeffry Beeler Marcia Blumenthal Howard Karten Marcy Rosenberg Timothy J Scannell Brad Schultz Connie Winkler Marguerite Zientara
Chief Copy Editor	Cheryl M Gelb
Copy Editors	Barbara T VanScoyoc Gail Cohen Rosemary Loomis Elissa Mintz
Photography Editor	Ann Dooley
Editorial Assistant	Denise Petski
Editorial Cartoonist	Jim Orton
Contributors:	
Education	J Daniel Couger
Legal	Roy N Freed
Taylor Reports	Alan Taylor
Human Connection	Jack Stone
SALES	
Vice-President	Roy Einreinhofer
Administrator	Terry Williams
Display Advertising	Dennis Bannon
Classified Advertising	John O Leary
Promotion Director	Jack Edmonston
Market Research	Kathryn V Dinneen
CIRCULATION	
Vice-President	Margaret Phelan
Circulation Manager	Barbara Jeannetti
Customer Service Rep	Peggy Kelly
Assistant	Eleanor Smith
PRODUCTION	
Vice-President	Lee Vidmer
Supervisor	Henry Fling
Assistant Manager	Peter Holm
Typesetting Manager	Donna Turnbull

Please address all correspondence to the appropriate department at 797 Washington Street, Newton Mass 02160 Phone (617) 965-5800. Telex USA-92-2529

OTHER EDITORIAL OFFICES: Washington, D.C. : 821 National Press Building, 529 14th Street N W, Washington, D C 20045. Phone (202) 347-6718 **England:** Tony Vickers IDG Publishing Ltd 140-146 Camden Street, London NW1 9PF Phone 01-267 1201 Telex 851 264737 **W. Germany:** Hans-Jurgen Ballnath, Computerworld, c o CW Publikationens, Friedrichstrasse 31, 8000 Munich 40, Phone (089) 34-90-61 Telex 5215350 **Asia:** Hidetsuna Sasaki, Computerworld, c/o Dempa/Computerworld Company, Dempa Building, 1-11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141 Phone (03) 445-6101 Telex J2424461 **Australia.** John P Costello, Computerworld Pty. Ltd., 3 Bruce Street, Crows Nest, NSW 2065. Phone 929-5388 Telex SECCO AA25468 **Brazil:** Eric Hippeau Data News, c/o Computerworld do Brazil, Servicos e Publicacoes Ltda , Av Rio Branco 156 Sala 1222, Rio di Janeiro ZC 21 Brazil Phone 242-7395 Telex 212-1507. **Iran:** Shapour Namazi, Mideast Computer, Ferdowsi Avenue, Tehran Iran Phone 310251, Telex (951)212467

Second-class postage paid at Boston, Mass., and additional mailing offices PN127420. Published weekly (except a single combined issue for the last week in December and the first week in January) by CW Communications/Inc Copyright 1978 by CW Communications/Inc. All rights reserved ISSN 0010-4841. Reproduction of material appearing in *Computerworld* is forbidden without written permission Send all requests to Marion Kibbee

$1 00 a copy U S — $25 a year, Canada, Central & So America — $35 a year, Europe and Near East — $75 a year, other foreign — $125 a year (airmail service) Four weeks notice is required for change of address Please allow six weeks for new subscription service to begin

Computerworld can be purchased on 35 mm microform through University Microfilm Int , Periodical Entry Dept , 300 Zeeb Rd., Ann Arbor, Mich 48106 Phone (313) 761-4700 *Computerworld* is indexed write to Circulation Dept for subscription information

CW COMMUNICATIONS/INC.

Board Chairman/ Publisher	Patrick J McGovern
President	W Walter Boyd
VP-Marketing	Roy Einreinhofer
VP-Finance	William P Murphy
VP-Circulation	Margaret Phelan
VP-Production	Lee Vidmer

POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, MA. 02160. ac

VOLLIE T.M.

is ADR's Complete DOS/VS Online Program Development System

It does so much. For so little.

For so many.

Applications Programmers

VOLLIE has an online library, a powerful editor, and remote job entry and output facilities.

System Programmers

VOLLIE allows them to use the VOLLIE terminal as an operator's console, to view or interactively change files or libraries, and to monitor system performance.

Non-Programmers

VOLLIE can be used for online data and text entry.

Operations Department

VOLLIE eliminates card decks and expedites job control procedures.

With VOLLIE comes VOICE, a high-level language that executes under VOLLIE. VOICE can be used to write interactive procedures for job scheduling, data entry, and applications problem solving.

Management

VOLLIE provides security, audit trail information, and control over the programming environment.

The On-Line Software Builders™

APPLIED DATA RESEARCH®

Route 206 Center, CN-8, Princeton, NJ 08540

Each ADR product is not just a program but a complete package with full documentation and on-site support. ADR is the only software company with 50 branch offices and representatives throughout the world—each staffed with ADR-trained technicians.

ADR software products: In use at over 9,000 installations worldwide.

☐ Send VOLLIE information.
☐ Please call me.

Name/Title

Company

Address

City/State/Zip

Telephone Computer Configuration

Virginia Today Conducting Canvass in Senatorial Race

By Tim Scannell
CW Staff

RICHMOND, VA. — The state Board of Elections here will complete its official statewide canvass of the U.S. Senate election votes today to settle a contest that has been troubled by computer foul-ups and human inaccuracies.

Unofficially, Republican John W. Warner defeated Democrat Andrew P. Miller earlier this month by 5,190 votes in what has been described as the closest general election in recent Virginia history. However the accuracy of that figure and of the entire 1.2 million vote count was questioned because of the numerous delays and discrepancies which plagued the News Election Service's (NES) computer, used to process the Virginia returns on Nov. 7-8.

The NES computer, located in New York, apparently listed more voting precincts in Virginia than the 1,857 the state actually has. At one point, it failed in the middle of a vote count, according to election officials.

In fact, the NES computer went down intermittently throughout the election night, delaying returns and coverage across the country [CW, Nov. 13].

Richard Eimers, NES executive director, acknowledged that the computer was beset with various problems that night, but said he was unaware of any errors in the results.

In addition, the unofficial figures were clouded by the counting of absentee ballots. Some precincts included those votes with the Election Day results, while others processed and returned them separately, officials said.

Tables Could Turn

Because of the numerous errors and Warner's less than one-third of 1% unofficial victory margin, state election officials have cautioned that Miller could easily emerge as the victor following today's canvass. In last year's gubernatorial election, Gov. John N. Dalton unofficially lost to his opponent by 7,000 votes but was declared a winner after the election results were officially compiled.

However, an unofficial survey of city and county election results conducted by both the NES and the Associated Press revealed that Warner's margin had actually increased by about 600 votes.

Meanwhile, Miller acknowledged that his rival for the U.S. Senate seat is the race's "apparent" victor and said he believes Warner received "the next higher number of votes." However, "that's no concession," he said.

The election board's official vote total is determined by using two sets of election documents — tally sheets, which are used to record the votes at each of the state's 1,857 precincts, and "abstracts," or the official vote totals compiled by city and county election officials. The state's official canvass is always held on the fourth Monday in November following each election.

Although neither candidate has accused the election board of any irregularities, Miller recently petitioned and received the circuit court's permission to review election documents before today's official canvass.

Mid-Sized CPU Joins NCR's I-8400 Family

By Howard A. Karten
CW Staff

DAYTON, Ohio — NCR Corp. has beefed up its I-8400 family with a medium-sized processor aimed particularly at businesses that need rapid file updating but don't want a superpowered system.

The I-8410 fits midway in power between an NCR I-8250 and an I-8430, a spokesman said. The unit uses the firm's previously announced I-8400 family software and is said to be totally compatible with those offerings. No new software was announced with the I-8410.

Scheduled for initial shipment in the first quarter of 1979, the processor can accommodate 256K- to 1M bytes of memory, in available increments of 256K. The device shares the bus-type architecture of other 8400 series systems and has a 112-nsec cycle time, the spokesman noted.

The system is aimed at small to medium-sized interactive DP users such as wholesale distributors and firms involved with order entry.

The system can also be used for batch and on-line applications through the use of floppy-disk-loaded firmware, the company noted. The firmware is not accessible to users.

In addition to being compatible with 8400 system software, such as NCR's Interactive Resource Executive, the system is said to be compatible with I-8100 and I-8200 software.

No peripherals were announced with the processor. However, NCR said it can accommodate from 81 million to 648 million bytes of disk storage, as well as previously introduced line printers, magnetic tape storage devices and CRTs.

A typical system configuration including 256K bytes of memory, four CRTs, 81 million bytes of disk storage and a 300 line/min printer sells for $105,130 and rents for $2,580/mo on a five-year agreement, the company stated.

ACS to Move Tasks From CPU Into Net

(Continued from Page 1)

work configurations today. As a result, the movement of certain communications functions from user host computers into the ACS network is supported," AT&T said.

Although the exact functions will depend on the user's application, the phone company said it could suggest some functions that might be included. The company mentioned polling, device handling, broadcast mode, authorization procedures, format and validation routines, error recovery and journaling.

Since terminal output and host input "need no longer be coupled," it serves no purpose for the host to furnish polling support. Even in inquiry/-response applications, where no time delay is specified, advanced polling of terminals by the network and subsequent polling of the net by the host can generate efficiencies, AT&T wrote.

With ACS hosts and terminals decoupled, it is no longer necessary to have the host provide communications management functions for the terminals. Moving this task into the network allows the host to accommodate a much larger range of terminals.

Since current address lists are maintained within network storage, user CPUs need only generate suitable messages. These are then transmitted to the appropriate devices connected to the net, Bell told the FCC.

A sophisticated authorization arrangement enables a user to define private subnetworks within the shared ACS net. This capability "extends opportunities for intercompany networking," Bell said.

In addition, messages entered into the net at different times can be stored and consolidated into larger messages. This feature can obviate the need for format and validation support at the host, it added.

Error recovery is handled within the network because it is undesirable to burden the user's mainframe with this task, Bell said. In addition, the net will provide the ability to keep abbreviated records of transmitted messages at either transmitting or receiving stations. This journal capability has long been a feature of message-switching systems, AT&T added.

Unsuitable for Data Base

Responding to a query on whether ACS could be used as a data base system, AT&T told the commission that the only way for customers to store data on ACS would be in the form of messages or through customized communications programs. ACS is unsuitable for use as a data base system because "the techniques of data base management are absent from the service," AT&T wrote.

The service will not provide the means for developing relationships between items of data contained in different messages or to retrieve items from messages stored within the network. So while the customer's use of ACS for data base purposes is not precluded as a theoretical matter, "no practical application can be anticipated," Bell said.

Potential Costs

On questions related to potential costs for ACS, AT&T said it was working on a Cost of Records System that will allow costs to be allocated to specific ACS rate elements.

While it listed no specific cost data, Bell did describe the four components that will be used to calculate an ACS user's bill. These include a count of packets or bytes transmitted, the number of Network Resource Units (NRUs) utilized, the kilobytes of network storage used as a function of an as yet unspecified unit of time and the elapsed network time used by the customer.

The NRUs will determine the communications management functions within ACS that have been used. Packets will be counted for calls and bytes will be counted for messages to measure the transport facilities that have been utilized, Bell said.

Within the five basic classes of terminal devices ACS will support, AT&T cited more than 500 models listed in various DP reference publications. It is expected that terminals on the list will be ACS-compatible but this is not a certainty, according to Bell. In addition, other terminals not specifically listed may be ACS-compatible, AT&T said.

Applications that particularly lend themselves to ACS usage, according to Bell, include order entry between manufacturer or distributor and supplier; transmission and control of freight shipment documents between shippers, freight carriers and consignees; reservations processing for travel-related organizations; claims processing between medical centers, doctors offices and health insurance companies; and insurance policy and claims processing.

Got a backup computer facility?

There's always the chance something or someone can "get to" your computer and put it out of business. Fire, flood, explosion, act of nature, disgruntled employee.

How long could your company stay in business without its computer resources? A month? A week? A day? At all?

You may qualify for limited membership in a national network of Recovery Operation Centers, all equipped with supporting computer and data communication systems to suit its members' needs.

Let us hear from you. We're the leading management consultant in computer security, the proven name, advancing the state of the art through our work with 400 major corporations.

DPS Data Processing Security

Dallas Fort Worth 235 N.E. Loop 820 Hurst, Texas 76053
Telephone 817 589-2244
Regional Offices Atlanta Chicago Los Angeles New York

ONLY 19 MORE DAYS!

DDI's YEAR-END SALE!

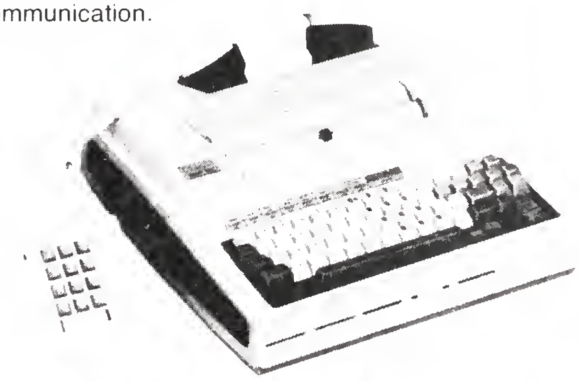
If you need new TI 765's and/or LA-36's, now is the time to get them — and save.
Our sale offer ends Dec. 15, 1978 and applies only to new orders, received and accepted by that date.
Call us. You'll get a firsthand demonstration of why DDI's purchasing power and nationwide support program give you the best way to handle all your data communications product needs — all year round!

OFF-THE-SHELF DELIVERY!

NOW $2,575

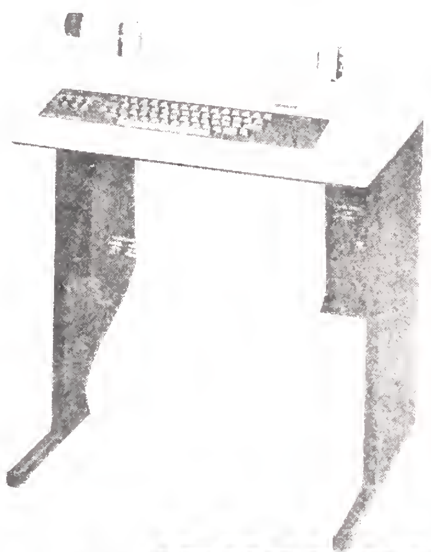
TI 765 KSR Portable with Bubble Memory
(DDI's single unit sale price)

TI's 765 enables you to carry data wherever you go and retain it without power. No cassettes, diskettes or paper tapes to bother with. Stores 20K characters for transmission at any time up to 30 cps. Provides for fast, on-the-spot data retrieval, entry, editing and communication.



NOW $1,290

LA-36 DECwriter II
(DDI's single unit sale price)



Don't miss out. Call one of these DDI Hot Lines now!

Remember, in addition to TI and DEC, DDI offers DIABLO, ADDS, OMNITEC, TECHTRAN, and our exclusive new UNITECH data entry/batch/RJE and DURANGO terminal systems.

New York City	(212) 687-2030	Cincinnati	(513) 769-0680	St. Louis	(314) 432-6121
Morris Plains, N.J.	(201) 267-2311	Detroit	(313) 358-2600	Dallas	(214) 387-2222
Philadelphia	(609) 662-2833	Chicago	(312) 858-3770	Houston	(713) 961-4711
Washington, D.C.	(202) 686-5150	Atlanta	(404) 433-2023	Los Angeles	(213) 990-9200
				San Francisco	(415) 349-7262

Data Dimensions, Inc.®
51 Weaver St., Greenwich, Ct. 06830 • Tel: (203) 661-1700

America's leading terminal supplier.

ACM to Honor Weiss at Confab Next Week

WASHINGTON, D.C. — A series of DP professional awards and a government program featuring speakers from Congress and the executive branch will highlight the annual meeting of the Association for Computing Machinery (ACM) here next week.

The Distinguished Service Award, described as the ACM's chief prize for nontechnical achievement and one in a series of awards for DP excellence, will be presented to Eric A. Weiss of Sun Co.

The Distinguished Service Award will be presented to Weiss on Dec. 4 in recognition of his contribution to ACM and the computing community, particularly in the field of publications and publication policy.

The government program will include speeches by Rep. Jack Brooks (D-Texas), Rep. Charles Rose (D-N.C.) and Paul Bortz, deputy assistant secretary of the National Telecommunications and Information Administration (NTIA).

Other Recipients

Other award recipients will be Robert W. Floyd, a Stanford University professor, who will receive the A.M. Turing Award for technical accomplishment for his work to improve software, and Raymond Kurzweil, who will receive the Grace Murray Hopper Award for his development of a computer system that reads printed pages aloud to the blind.

As part of the government program, Brooks, the sponsor of the primary piece of legislation affecting government computing, will discuss the Brooks Act and its impact on federal DP over the last 10 years. Rose will describe the growing use of computers by Congress and the resulting opportunities for increased efficiency in the legislative branch.

Lester Fettig, administrator for federal procurement policy in the Office of Management and Budget (OMB), will describe the challenges facing the government as the single largest consumer of computer products.

Report on Reorganization

The results of President Carter's effort to reorganize federal DP will be presented by Wayne Granquist, also of OMB.

Addressing an area that is anticipated to have implications for the entire DP field, the NTIA's Bortz will discuss the prospects for a national information policy. Finally, Frank Carr, the commissioner of the General Services Administration (GSA) Automated Data and Telecommunications Service, will describe a number of efforts designed to better manage and coordinate computer and telecommunications policy.

Further information on the conference, which will be held Dec. 4-6 at the Sheraton-Park Hotel, is available from Dennis M. Conti, National Bureau of Standards, Washington, D.C. 20234.

WANT TO BUY
IMMEDIATELY
DEC 10 • 20
11/70 • VAX
SYSTEMS OR COMPONENTS
CALL TODAY!
AMERICAN USED COMPUTER • 617-261-1100
P.O. BOX 68, KENMORE STATION, BOSTON, MASSACHUSETTS 02215

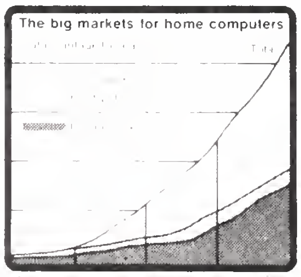
COMPUTERLAND
". . . the leader in this new field is a franchise operation called Computerland Corp."
—FORTUNE, 1978

THE MARKET Today annual sales of microcomputers are over $100 million By 1985 that total may top the $2 billion mark.

THE OPPORTUNITY A ComputerLand retail franchise lets you in on this explosive market The package includes business systems intensive training central buying advertising And more

THE QUALIFICATIONS Interest in microcomputers comes first Next your management and sales ability Finally an investment of about $100 000 for a fully stocked and outfitted store We will assist you in obtaining bank financing

INTERESTED? Join our rapidly growing international franchise network 57 stores now open Key locations still available For instant action call (415) 895-9363 In Europe call 43 29 05 TELEX (848) 2423 [CMPLND LU] Or send the coupon for a detailed brochure



ComputerLand

Mail to E. E. Faber, President, ComputerLand Corp., 14400 Catalina St.
San Leandro, CA 94577 U.S.A.

Name Occupation
Address City
State Zip Phone

Grand Jury Indicts Rifkin In $10 Million Theft Scheme

By Tim Scannell
CW Staff

LOS ANGELES — A federal court has indicted Stanley Mark Rifkin on federal charges involving the theft of $10.2 million from the Security Pacific Bank here last month, and the Federal Bureau of Investigation has arrested a local photographer on charges of hiding the alleged swindler in his apartment.

A federal grand jury charged the computer consultant with four counts of wire fraud, smuggling, interstate transportation of stolen property and entering a bank to commit a felony.

Rifkin was arrested earlier this month and charged with using Fedwire, the Federal Reserve's electronic funds tranfer system, to steal several million dollars from the Los Angeles-based bank [CW, Nov. 13]. The funds were transferred via wire to a New York City bank account and subsequently diverted to the Swiss account of Russalmaz, the Soviet government's official diamond broker.

Rikin allegedly purchased more than $8 million worth of polished stones which had an estimated retail value of approximately $13 million on the open market.

Closet Case

Meanwhile, the FBI recently arrested Daniel Wolfson and charged him with harboring and concealing a fugitive after he reportedly tried to prevent agents from arresting Rifkin by hiding the consultant in his closet.

Although more than one newspaper has reported that Rifkin had accomplices during the theft, special agent Roger Young of the FBI's San Diego office said the incident appeared to be a "one-man operation." The transaction with the Soviet firm was a "legitimate deal," Young added, because the company had no way of knowing the money was stolen.

No date has yet been set for Rifkin's trial.

Persistent Teens Compute Largest Prime Number Yet

(Continued from Page 1)

mainframe. "She'd stay out all night and periodically run away from home, and her parents quite rightly objected."

Noll, a Hayward High School senior who is taking an honors calculus course at Cal State, seemed to weather the project with little domestic fuss, Jurca added.

Administrative Opposition

In addition to causing strife at home, the Nickel and Noll undertaking encountered stiff resistance from Cal State administrators, who knew that a hunt for a very large prime number would consume hundreds of hours of expensive computer time.

Opposition to the project proved so great at one point that Jurca doubted the two would ever gain official approval to use the school's computer facilities.

But the youths ignored his dire warnings and persevered with an almost "fanatical" determination, the math lecturer recalled.

Nickel and Noll, who learned the basics of computer programming three years ago at Hayward High School, first became interested in computing very large numbers when they spied a Cal State math department poster showing a huge quantity that had been calculated by one of the nation's top young scientists.

Determined to duplicate the feat, they sought the advice of Jurca and Math Department Chairman Dr. Arthur Simon and in May 1977 began writing the first of five versions of a machine language program intended to find the world's largest prime number.

With Jurca's help, they finally gained access to the Cal State mainframe and on Oct. 11 began their computer search for the astronomical integer. After 44 tests and less than three weeks of hunting, the pair's persistence was at last rewarded.

Correction

General Telephone Co. has been responsible for engineering the home energy monitoring pilot program at the Top of the World School in Laguna Beach, Calif. [CW, Nov. 13]. "Schoolchildren to Monitor Homes' Energy Use" identified Pacific Telephone Co. as the firm involved. In addition, the students live in Laguna Beach, not in Newport Beach.

With Analysis Variance Programs

Disciples of Bacchus Automate Wine Rating

By Ann Dooley
CW Staff

DAVIS, Calif. — What's red or white, makes one "tight" and can now be data processed overnight?

Wine, of course — in an automated wine-rating system at the University of California at Davis.

Yes, Bacchus has traded in his wreath of grape leaves for a DP manual. Wine produced by Davis students is now being rated for quality and taste on a mainframe.

Students in the viticulture (grape production) and oenology (wine-making technology) departments here produce the wines by blending ethyl alcohol, polyphenols and several hundred other compounds. Although they still employ the traditional sniff, sip and taste method to judge the wines, the CPU is used to analyze and mathematically rate the blend of the different compounds in each of the wines.

The automated wine rating, which has been at work for nearly eight years, utilizes analysis variance programs on the university's Burrough Corp. B6500 to judge the chemical content of the wines. The time involved in analyzing wine compounds has been cut drastically; wine making is a long, involved process, so this is a real time-saver, according to Walt Winton, department research associate.

The system compares one wine's taste with another or compares wines which have received different treatments in order to determine which is the best quality. Wine can be changed by so many variables, and sometimes the smallest change can create a significant difference in taste and quality, Winton explained.

Different treatments can be conducted in the vineyard or in the winery, all of which affect the wine. Multiple regression techniques have become essential to predict the resulting product with any amount of accuracy.

The automated system allows students to determine what affect each variable has on the finished product and gives them an idea of what is needed to produce a good wine, Winton said.

In addition to the Burroughs system, a Tektronix, Inc. desktop computer with 32K of memory is used for some of the simpler variance changes.

Wine Goes, Data Stays

Much to any seasoned drinker's dismay, the wine produced by the students is discarded after it has been tasted and analyzed. The wine "goes down the drain" because of state laws and university tradition, according to Winton.

The data from the wine analyses, however, is stored on tape for future study, and 75 different wines are kept in a wine library to see how they age over the years.

While it is difficult to tell how much wine is discarded every quarter, each student is required to produce eight wines. There are more than 155 students in the department, and all must take the course at one time or another.

Many of the California vintners, such as the Gallo and Robert Mondavi vineyards, use an automated system to rate the wines produced, experiment with new breeds and blends or maintain a quality control system.

Another automated wine tester at the university is researcher Ann Noble, who performs sensory evaluations of the wines on the computer. Statistics involved in analyzing wine can be done by hand but it's just too much trouble computers are the only way to go, Noble said.

Noble's work involves separating and quantifying the wine. Using this weeding-down process of the finished product, she can split the effluent in order to determine the variables that create the various aromas in the wine.

Working primarily with Cabernet Sauvignon, Noble uses multiple regression tables to determine why something smells like a certain attribute of the wine. The work is purely descriptive analysis, with the computer used as a tool for statistical analysis techniques, she said.

Lightwave Test Set for Atlanta

NEW YORK — The Atlanta area will be the site of the Bell System's first standard lightwave communications system, which will use glass fibers and lasers to carry voice and data among three telephone central offices, AT&T has announced.

The Atlanta system will be placed in service by Southern Bell Telephone and Telegraph Co. in the fall of 1980, according to a spokesman.

In May of this year, AT&T reported the successful one-year trial of a full-service lightwave installation in Chicago. The Chicago test involved a 1.5-mile link under downtown streets between two Illinois Bell Telephone Co. switching offices and between one of those facilities and a downtown Chicago office building.

Other experimental or special application installations of lightwave systems are slated for Connecticut, Florida and Arizona.

"How did you get your on-line system up and running so fast?"

"We use TASK/MASTER."

Up and running means more than just talking to a terminal. It means you've got on-line applications that work, a system that's been tuned for fast response, and a lot of happy users.

With TASK/MASTER you'll be up and running sooner than with any other TP monitor. And with a lot less effort. For the past seven years we've added new features to TASK/MASTER with only one thought in mind. Putting you on-line as quickly, and painlessly, as possible.

Features like built-in data entry for example. With TASK/MASTER you can design, test, and implement a complete on-line data entry application while sitting at a terminal. Your programmers don't have to lift a pencil. There's no coding, no compiling, and no delay.

Plus other features like automatic restart. On-line diagnostic aids. Interfaces for any DBMS or terminal you select. Built-in message editing. All developed from years of experience providing on-line software to a worldwide market.

If you're going on-line, TASK/MASTER can get you where you want to be. Up and running. Quicker and easier than any other TP monitor.

Clip the coupon, or call. We'd like to show you how.

turnkey systems inc.
111 east avenue
norwalk, connecticut 06851
(203) 853-2884/telex 964351

839 mitten road
burlingame, california 94010
(415) 697-1833

tsi international, ltd.
19 bedford row
london WC1R 4EB, england
01-405-7304/telex 23302

additional
representation
worldwide

☐ Please send us a TASK MASTER brochure
☐ Our need is immediate. Give us a call
☐ We'd like an on-site presentation

Name ____________
Title ____________
Company ____________
Address ____________
City ____________ State ______ Zip ______
Phone ____________ CPU ____________

Use of Encryption on Fedwire Under Study

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The Federal Reserve Board has undertaken a research and development project to determine the feasibility and cost of using data encryption devices to protect the Federal Reserve System's Fedwire operations.

Fedwire is an electronic funds transfer (EFT) system connecting "Fed" member banks around the country. With about 500 banks currently on-line, Fedwire last year handled 25 million transfers of funds and government securities representing $43.2 trillion.

Three firms have developed prototype encryption devices for use on the system, and the devices are currently in use in undisclosed locations around the country.

The Fed hopes to finish up this field-testing stage of the project within the next six months, according to Richard P. Anstee, program manager for EFT planning in the Fed's Division of Bank Operations. It is hoped, he said, that the project will provide enough information to judge the benefits and costs of using data encryption with the Fedwire system.

The prototype devices utilize the Data Encryption Standard (DES) developed by IBM and approved for government use two years ago by the National Bureau of Standards (NBS). It was the approval of the DES that prompted the Fed's R&D project, Anstee said.

The availability of DES and the state of current technology suggest encryption could be used on Fedwire much more cheaply than before. In addition, now that there is a public encryption algorithm, the devices will not require a large amount of protection, lightening the administrative burden associated with data encryption, Anstee said.

However, he added, "we felt that we just did not know enough about encryption or what the impact of it would be on our operations" to decide whether to use DES devices on Fedwire when the algorithm was first approved by NBS.

No Decision Yet

The Fed's Committee on Communications, which manages Fedwire, began talks last year with approximately 10 firms about undertaking a joint R&D program that would provide vendors with the opportunity to develop DES-based devices and provide the Fed with the information needed to decide whether to use the devices on Fedwire.

Anstee stressed that the project does not mean the Fed will necessarily use encryption and said there is no overwhelming concern about the security of the Fedwire operations. No encryption is used on Fedwire at this time.

The project was undertaken to allow the Fed "to make an enlightened decision" on whether to use encryption and, of equal importance, to determine the costs of such use, he explained.

The Fed eventually chose three vendors to develop prototype encryption devices for trial use on Fedwire. Anstee would not identify them or specify where their devices are being used, although he did say they are "in actual operational situations as much as possible."

It will be some time before the final decision on Fedwire use of the DES is made, he said, describing the R&D project as "long-term."

NCR Brings Out Its Largest CPUs Yet

(Continued from Page 1)

Although no software was introduced with the systems, the spokesman said an extended version of the company's Virtual Resource Executive (VRX) will be available when deliveries of the system begin.

The bus architecture is 32 bits wide and can transfer data between subsystems at a rate of 72M byte/sec, the company said. The bus is the link between components of the system and functions as a single high-speed data path, the spokesman explained.

Contributing to the power of the processors are the pipeline design and the microcode, the company indicated. The processor cycles at 28 nsec and uses the pipeline design to execute instructions. This design breaks each instruction into segments, or stages, for concurrent processing.

The microcode, or firmware, is loaded from a flexible disk that can be biased for different applications or languages. This allows the systems to be "conditioned" for specific languages, providing faster compiling and execution than conventional processors which are not language-oriented, the spokesman said.

The power of the processors is further increased through the use of a cache memory, or fast access buffer, which is said to reduce memory access time by a factor of six. The V-8650 supports a 32K-byte cache memory, while the V-8670 supports a 128K byte cache.

The V-8650 uses a single medium-scale processor and the V-8670 uses two such units; these monitor all systems elements continuously. Each processor controls two CRTs that function as either operator consoles or system diagnostic units.

Either of the consoles can perform diagnostics concurrently with normal operations, NCR said.

I/O for the system is accomplished through the use of channel control processors. Two to four of these processors, each controlling up to 32 subchannels, can be attached to either system. Each channel has a 2M byte/sec transfer rate, the company claimed.

Memory cycle time on both systems is 380 nsec, according to the company, and both systems access 1G bytes per cycle.

The family of processors is based on NCR's "Migration Path Engineering," NCR said, which allows for transportation of both systems and application software from the company's smallest systems, the 8000 series and Century systems, to its largest, the V-8600.

Also introduced by the company was a disk drive with a capacity of more than 16 bytes. The Model 6550, said to offer twice the capacity of NCR's previously largest disk, has a transfer rate of 1.2 M byte/sec.

The disk drive costs $69,000 or $1,845/mo on a one-year lease.

A V-8650 with 32K bytes of cache memory and 4M bytes of storage will cost $1,776,500 or rent for $39,200/mo on a five-year rental agreement. That price includes an operator console and two I/O channel control processors capable of serving up to 16 I/O channels.

A V-8670 with 128K bytes of cache memory and 4M bytes of storage costs $2,555,000 or rents for $53,500/mo, also on a five-year arrangement. An additional 4M bytes of memory on what the company called "larger configurations" carry a purchase price of $196,800.

William S. Anderson, chairman of the company, said NCR's "continuing development of advanced large-scale systems means all current users of NCR systems — from terminals to minicomputers to mainframes — are assured the widest range of compatible processing power in the industry."

We are pleased to announce
that our
New Jersey office
is now located at
275 Route 18
East Brunswick, New Jersey 08816
(201) 254-4300

Allan N. Botwinick
Senior Marketing Representative

CSA
Computer Systems Of America Inc.
141 Milk Street, Boston, Ma. 02109
(617) 482-4671

need pointers on database?

Do you want to:

- *Develop new systems in 1/5 the usual time?*
- *Reduce environmental maintenance?*
- *Provide your company with a software capability that delivers answers within the timeframe needed to make today's decisions today?*

RAMIS II lets you do all this. RAMIS II is the only product that integrates an English-like nonprocedural language for report preparation and records management with a comprehensive DBMS.

At the same time RAMIS II provides significant, quantifiable cost benefits to an organization, it also offers DP and MIS departments a significant intangible benefit—By removing much of the detailed coding function, RAMIS II provides an atmosphere where the best people can do their best work.

You can use RAMIS II on your own IBM 360/370 or comparable computer, or on one of a dozen bureau networks on a usage basis.

To find out more, join us for a free seminar:

Boston, November 29
Denver, November 30
Pittsburgh, November 30
Dallas, December 5
Glen Cove, NY, December 5
Chicago, December 7

Call, get the details, and make your reservation today.

In New Jersey: 609-799-2600
Outside New Jersey, dial toll free: 800-257-9576

Join us for a Seminar on RAMIS II

Mathematica Products Group • A Division of Mathematica Inc. • 14 Washington Road • Princeton, New Jersey 08540

Storage Element Goes Down

DP Failure Holds Up Traffic at Three Airports

By Marguerite Zientara
CW Staff

ISLIP, N.Y. – The brief failure of a single computer storage element compounded the usual morning rush hour problems at the Air Route Traffic Control Center (ARTCC) here 12 days ago and resulted in one-hour delays for about 75 airplanes at the three nearby major airports.

The breakdowns, which occurred between 9:02 a.m. and 9:30 a.m. on Nov. 15 affected departures from LaGuardia, Kennedy and Newark airports, with the longest delay – 61 minutes – recorded at LaGuardia, according to Ian Wolf, data systems officer at the ARTCC.

The ARTCC here is one of 26 flight control centers in the country that contol planes between their departure points and their final destinations.

Too Much to Handle

The runway slowdown problems were caused by the ARTCC's inability to accept the normal traffic flow within a certian time frame from the airports involved, according to Peter Nelson, chief of the Common Instrument Flight Rules (IFR) Room at Kennedy Airport.

The Common IFR Room at Kennedy, for example, directs planes from departure to an altitude of about 17,000 feet within a 50-mile radius, then hands them off to the ARTCC, Nelson explained.

"When the ARTCC's computer shuts down, it deprives us and airport control towers of the automated flight data information,". Nelson said. "We still had our radar tracking capabilities here, but since our computer couldn't communicate with the ARTCC computer, we couldn't make automatic handoffs and automatically exchange data."

Exchange by Voice Lines

All data then had to be exchanged by telephone voice communications. "We could have continued to operate at very close to normal," Nelson said. "However, they couldn't accept the traffic as fast as we could give it to them, and dissemination of information out there becomes critical" because of safety factors.

The precise cause of the failure is still under investigation because "the hardware fault itself shouldn't have resulted in a significant outage," according to Roland Jenkins, ARTCC sector manager.

Storage element failures are usually backed up by the automatic configuration of a "spare," Jenkins explained. Although the system did configure a spare on Nov. 15, "around that point some other things proceeded from that fault, and those failures are under investigation.

The ARTCC uses a specially configured IBM 360/65 known as the 9020E with four 128K-byte Model 9 storage elements. The 9020E is used to process flight data for air traffic controllers radarscope displays.

With the computer failure, ARTCC controllers worked from radar and voice contact with pilots for information usually displayed on their screens, such as altitude, speed, airline name and flight number.

No Complaints

Noting that the failure was in no way similar to the recent failure of a 9020E at O'Hare International Airport in Chicago that caused massive air traffic slowdowns throughout the Midwest [CW, Nov. 6], Wolf said the problem had never happened here before.

"You have to understand that hardware fails and the system is designed to be tolerant of hardware failures. When that occurs normally there's another piece of equipment that can automatically under program control be reconfigured into the system," he continued.

"The reconfiguration process causes no interruption in the operation and from this standpoint this was an unusual occurrence," Wolf said, adding the ARTCC has no basic complaints concerning its computer equipment.

Officials stressed that air safety was not jeopardized at any time and that the delays were caused by measures taken to ensure the safe separation of aircraft.

Cybertek Paying Smokers to Quit

LOS ANGELES – After Vaughn Morgan, president of Cybertek Computer Products, Inc., calculated it costs his company $675 per smoker per year, Cybertek began offering employees $500 to kick the habit.

Morgan estimated the smoking habit consumes about 15 minutes per day, or 3% of the work year. Basing that percentage on the average $22,500 salary paid at his firm, he figured that each employee who smokes costs the company $675 a year.

According to the Cybertek plan, an employee who quits smoking for a year is awarded a $500 bonus. In January, 23 employees applied for the bonus; 13 are still not smoking.

The program is strictly on the honor system, a company official said.

THE BEST

NOW COSTS LESS

Now it costs less to own the product that scored highest in Datapro's survey of alphanumeric display terminals for an unprecedented second straight year.

Now it costs less to own the award-winning terminal that's been providing end users, OEM firms and systems houses a level of price and performance unmatched in the industry . . . the commitment to quality in workmanship that gives new definition to reliability . . . and the belief in service after the sale that adds a new dimension to responsiveness.

It's called making a great value an even greater one. From Datamedia.

CRT's to meet your needs

- Character Interactive
- Buffered Editing
- ASCII APL
- Portable
- Programmable
- DEC VT-52 Compatible

Call now about our new prices.

Datamedia Corporation

7300 N. Crescent Boulevard • Pennsauken, New Jersey 08110

Gaithersburg, MD 301/948/1670
Houston, TX 713/871/0320
Los Angeles, CA 213/397/3556
Minneapolis, MN 612/483/0858
Pennsauken, NJ Tel: 609/665/2382 TWX. 710/892/1693

Datamedia terminals are distributed by:

NEW ENGLAND
Boston
Marketech
617 237 4343

MID-ATLANTIC
Hillsdale
Eastern Terminals & Communications
201 664 1050
New York City
Eastern Terminals & Communications
212 291 2957
Philadelphia
Eastern Terminals & Communications
215 757 5136
Rochester
Western New York Computing Systems
716 381 4120

SOUTHEAST
Miami
Radix II Corporation
305 274 8300

MOUNTAIN STATES
Denver
American Teledata
303 427 2900

SOUTHWEST
Albuquerque
BFANM Corporation
505 292 1212
Austin
Systems Support Group
512 454 6361
Dallas
Nockel Data Communications
[illegible]
Systems Support Group
[illegible]
Houston
Nockel Data Communications
713 688 9588
Systems Support Group
713 667 6824
Las Cruces
BFANM Corporation
[illegible]

FAR WEST
Irvine
Computer Datacom
[illegible]
Long Beach
[illegible]
Redwood City
[illegible]
San Diego
[illegible]
San Jose
[illegible]

NORTHWEST
Portland
[illegible]
Seattle
[illegible]

Additional distributor inquiries invited

Batch System Consolidates Patient Blood Data

By Marcy Rosenberg
CW Staff

NEW YORK — A major medical center's blood bank here was suffering from hardening of the DP arteries until the center implemented a computerized reporting system that provides quick access to patient and blood usage information while sharply reducing paperwork.

For years, the blood bank at New York University (NYU) Medical Center relied on two Access Corp. mechanical card retrieval devices to store general patient information — name, blood group and type — and data on problem patients in two separate locations.

Contained in file drawers, these systems were unwieldy and unreliable because of occasional mechanical breakdowns that necessitated time-consuming manual lookups, according to Dr. Harold Kaplan, blood bank director.

Also, a growing volume of activity — about 35,000 blood transfusions last year alone and twice as many related blood sample cross-matches — began to tax the capacity of the access drawers, Kaplan said.

Rather than spend between $5,000 and $10,000 for another Access system, the blood bank turned to the medical center's own IBM 370/138 and developed a cost-effective batch mode reporting system.

Called the Blood Bank Management System (BBMS), the batch system consolidated patient information from the various Access sites into one convenient form, with added capability to generate blood usage and patient file statistics, Kaplan said.

BBMS programs were written in ANS Cobol and run under DOS/VS. All of the blood bank's files are contained on one IBM 3340 disk pack, according to Lyn Kahn, former NYU systems analyst who designed and implemented BBMS. She is now an independent systems development consultant.

The blood bank considered going on-line, she said, but it did not want to change its recordkeeping methods, could not afford to rent an off-site system and had no room to install one in-house. "We didn't have extra personnel to do data entry," Kahn noted, "and while the technologists could have done it, space limitations precluded putting a terminal at every desk."

Designed to Fit

BBMS, on the other hand, was designed to fit the operating procedures already established at the blood bank. Data is key recorded directly from technologists' source documents, thus reducing turnaround time and transcription errors, Kahn explained.

"Originally, we were going to use optical character recognition (OCR) equipment," she said, "but at the time, OCR wasn't sophisticated enough to deal accurately with handwritten data."

Data input to BBMS includes patient blood records, summary medical histories for patients whose cases require additional demographic and historical information and blood salvage ledgers to record blood units that were never transfused.

The system outputs such statistical reports as technologist workload, blood usage by service and type of patient and counts and ratios of specific components and tests.

It also produces a directory on microfiche which is updated weekly and contains demographic and problem data on all patients seen since 1972. This file allows technologists "to verify an active patient's blood group and type against past records," Kahn noted.

In the two years BBMS has been in operation, Kaplan said, it has cut down clerical work, has provided "reliable and timely access to accurate records," and, through consistency editing, has helped to guard against key recorder errors and incompatibilities between blood donor and recipient.

In fact, the system has worked out so well that the blood bank plans to use it for billing by the first or second quarter of 1979. Billing is now done via a "slip batching" procedure which requires that forms travel through three separate departments.

Charges depend on whether a patient was transfused, cross-matched only or had tests done, Kaplan said, "and since this information is part of BBMS patient records anyway, all we would have to do is add on the billing number."

On the whole, Kaplan remarked, BBMS "has made it easy for us to get valuable information in a painless way."

West Coast Meet Set for January By Law Group

LOS ANGELES — The Computer Law Association, an organization of lawyers and law students concerned with the legal aspects of information processing, will hold its third West Coast Conference at the Hyatt House Hotel here Jan. 25. The purpose of the conference will be to update attendees in key areas of computer law, according to a spokesman.

Sessions at the one-day conference will include:

- "Protecting Proprietary Rights in Software and Hardware," dealing with the current status of the law as well as alternative forms of maintaining and asserting rights in computer programs, devices and data.
- "Managing the Disclosure of Data and Data Bases," which will present recent developments in information privacy, trade secret litigation, and freedom of information.
- "Safeguarding Data and Computing Hardware," which will address practical approaches to dealing with computer fraud, unauthorized disclosure of data and threats to physical security.

Registration fee is $30 for association members and $45 for nonmembers.

For further information or advance registration contact Richard L. Bernacchi, Irell & Manella, Suite 900, 1800 Avenue of the Stars, Los Angeles, Calif. 90067.

Data Communicators....UNITE!

Unite your computer or terminal with the Telex network using the UTEC Microline' microprocessor. The terminal interface is RS-232 standard, allowing your system software to remain unchanged.

MICROLINE EIA-to-Telex Converter

Our interface device converts codes and performs automatic dialing and call progress routines. Character expansion is generated where needed to make the two codes interchangeable. Memory is provided to accommodate any speed difference between the computer or terminal and the Telex line.

Other full-duplex converters are available, such as:
- Computer or Terminal to TWX/DDD Network
- TWX-to-Telex
- Bisync-to-Async

The Microline' is an attractive desk-top unit and is also available in a rack-mounted version.

For additional information regarding your specific application, call or write UTEC today.

UNIVERSAL TECHNOLOGY INC.
871 Allwood Road, Clifton, N.J. 07012
Phone: (201) 779-0430

UTEC

ORDER TODAY!
WE'LL SHIP IMMEDIATELY!
SYNCHRO-SOUND • The Computer People

LEAR-SIEGLER	Purchase	Lease*	CENTRONICS	Purchase	Lease*
ADM-3A	854.95	29.44	779	1294.00	41.95
ADM-31	1450.00	48.05	700	1520.00	52.35
ADM-42	1795 00	57.50	761KSR	2025.00	69.75
301 Printer	1995 00	65.27	703	2805.00	96.61
HAZELTINE			OKIDATA		
1400	699 00	27 51	CP110	1199.00	41.29
1500	1149.00	39 57	SL125	2449.00	84.35
Mod 1 Edit	1659.00	57.14	TELETYPE		
ADDS			43	1299.00	44.24
Regent 100	1095.00	37.71	TEXAS INSTRUMENT		
DECWRITER			745	1795.00	61.82
II-LA36	1495.00	51.49	810	1799.00	61.96
LA180	1895.00	65.27	820	2195.00	75.60
LS120RO	2095.00	72.16			

*36 Month Lease; Maintenance additional

OEM and Educational Pricing available

SYNCHRO-SOUND ENTERPRISES, INC.
The Computer People
193-25 Jamaica Avenue
Jamaica, N.Y. 11423
212/468-7067 TWX 710-582-5886

Hours 9-4 Daily
and Saturday
BankAmericard
Master Charge

Visit our
new showroom.
Working units
on display.

FOR OVER 10 YEARS THE LEADER IN COMPUTER ROOM DESIGN AND CONSTRUCTION

Whatever your special needs, whatever individual problems are inherent in your data processing rooms . . . STARNES is waiting to serve you. STARNES sells an entire concept of building, a whole service package. STARNES . . the dynamic name in environmental control for data processing equipment.

B.R. STARNES COMPANY
625 N. Michigan Avenue
Suite 1511 (312) 467-1850
Chicago, Illinois 60611

Up to 20% MORE WORK out of your multi-programming computer system.

JOMO

- JOMO loads the CPU for maximum computer usage.
- Informs the operator before the CPU is overloaded.
- Rates each job as a percentage of the CPU's capacity.
- Indicates which jobs run together for maximum usage.
- Histogram report shows management how CPU is being utilized.
- Extend your computing capacity without the addition of expensive hardware.

The most efficient job mix becomes the rule, rather than the exception.

Send for complete details on JOMO — job mix optimizer.

LABYRINTH SYSTEMS, LTD.
17 Barstow Road
Great Neck, NY · 11022
(516) 487-7766

Mail Order Firm Asks $1 Million

User Sues DEC for 'Fatally Defective' PDP-11

By Marguerite Zientara
CW Staff

OMAHA, Neb. — Omaha Steaks International has filed a $1 million suit in federal district court here against Digital Equipment Corp. for selling the mail order food marketing firm a "fatally defective" PDP-11/34 system.

The suit, filed in June and amended last month, charges that DEC installed the equipment in July 1977 but failed to make it work for on-line order entry operations until January 1978.

The 6-month delay "postponed our whole Christmas operation, our big crunch," according to Omaha Steaks President Alan D. Simon. "We had to go to a service bureau, which cost us an absolute fortune."

The company couldn't keep up with all its orders without the on-line system and finally fell behind by "about 9,000 orders." When the system did go on-line in January, it failed to operate on more than 20 business days over the next two months, according to Simon.

DEC never gave an acceptable explanation of what was wrong with the machine, he maintained. It first counseled the user to "give it a chance," then blamed the file access system and finally suggested that the problem lay in Omaha Steaks' applications programs, he said.

In Simon's view, however, the system was simply a "lemon." The problem seemed to be in the tape drives, the CPU and the disk drives, he said. "They kept sending guys out here to fix it, but nobody could fix it," he added.

The suit also claims that DEC would neither replace the equipment nor reclaim it and reimburse Omaha Steaks the $193,943.20 it paid for the system.

Improper Environment

A DEC spokesman acknowledged that DEC refused to replace the equipment for Omaha Steaks. "We sold it a system, having first advised it of the kind of environment it was going to have to provide for it. Omaha Steaks' problems stemmed from its failure to have provided the proper kind of environment, primarily in terms of power source," he contended.

The DEC spokesman said there were other things drawing on the line on which the system was running.

According to Simon, however, from July through November 1977, DEC could not get the system running and didn't realize what was wrong with it. "When it asked us to correct an electrical problem [in November], it was corrected within a day," Simon said, but the machine still didn't work after the adjustment.

Addressing the matter of a proper environment, Simon said that after DEC's "site preinspection," Omaha Steak's "did everything [DEC] asked us to do."

Since reliability was the key to the success of the on-line system, "it would have been stupid of us not to do what [DEC] asked."

Need for Reliability

According to the suit, "Omaha Steaks informed DEC that any breakdown in excess of eight hours would cause irreparable harm to its business and otherwise made it expressly known to DEC that . . . there was an absolute necessity for the computer system to be reliable."

The suit defined "reliability" as a system being available "not less than 99% of the time during normal business hours."

The suit maintained that "DEC expressly warranted and guaranteed Omaha Steaks that its computer system had proven reliability in the field and otherwise that it would perform the job . . . intended of it."

Sold to OEM

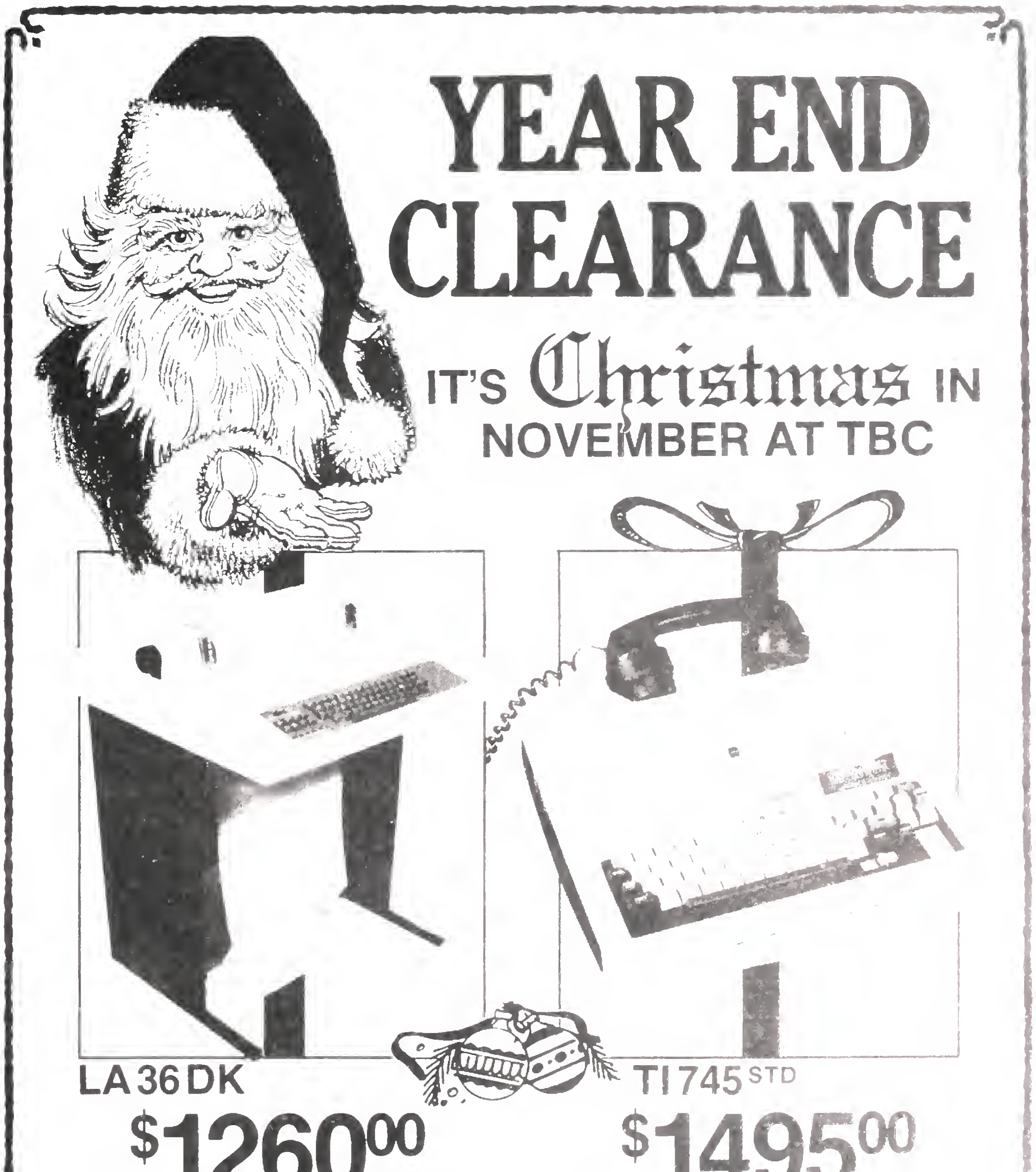
In March, eight months after having installed the equipment, Omaha Steaks sold the system to an OEM company for a low price, Simon said. It then used a manual order entry system until last July, when a Qantel Corp. system was installed.

The Qantel system, comparable to DEC's in size and in number of peripherals, "ran smoothly right from the beginning," according to Simon. "The only difference between the two systems was that one worked and the other didn't," Simon said.

The DEC system had consisted of a PDP-11/34 with 128K words of memory, nine VT-52 terminals, an LP-11WA 230 line/min printer, two 88M-byte disk drives and a TJE-16 tape drive.

The case is expected to be heard in federal district court here within a year.

158
System available for lease.
Want to purchase.
COMDISCO
312-698-3000



YEAR END CLEARANCE
IT'S Christmas IN NOVEMBER AT TBC

LA36DK
$1260.00
LS-120 $2070 LS-120RO $1795

TI 745 STD
$1495.00
PHONE (617) 449-0216

ALSO AVAILABLE:
LEAR SIEGLER ADM 3A, 31
TI 745 APL, 765 MEMORY TERMINAL
DIABLO 1620/1641

TBC
TERMINAL BROKERS COMPANY
BOX 312, 37 FRANKLIN ST.
NEEDHAM, MA 02192

Air Force Tests Workspace With 'Combiman'

By Ann Dooley
CW Staff

WRIGHT-PATTERSON AIR FORCE BASE, Ohio — A computerized biomechanical man-model (Combiman), a three-dimensional mock-up of the human figure, is being used at the Aerospace Medical Research Laboratory (AMRL) here to increase efficiency in workspaces.

Many workspaces, such as airplane cockpits, have precise spatial areas, and the size of the person functioning in that workspace can often be critical to efficient operation. If a person is too tall, short, large or small, he might not be able to function with maximum efficiency because he can't reach a control or doesn't have enough space to move around in, according to Dr. Joe McDaniel, AMRL research and industrial engineer.

AMRL has data on the physical dimensions of nearly 90,000 people in the U.S. and allied countries stored in an IBM 370/155. These representative samples of body measurements are tested by Combiman to determine which physical features would work most efficiently within a given space.

Regular Updates

The data bank includes dimensions on people from both the military and the civilian work force and is updated regularly to allow for changing body types.

Although the Aeronautical Systems Division uses Combiman to test cockpit designs, the system can be used for any kind of seated workspace, such as that in an automobile or in a factory assembly line area, McDaniel said. It took several years to develop the system, and Air Force R&D centers are just beginning to use it, McDaniel noted.

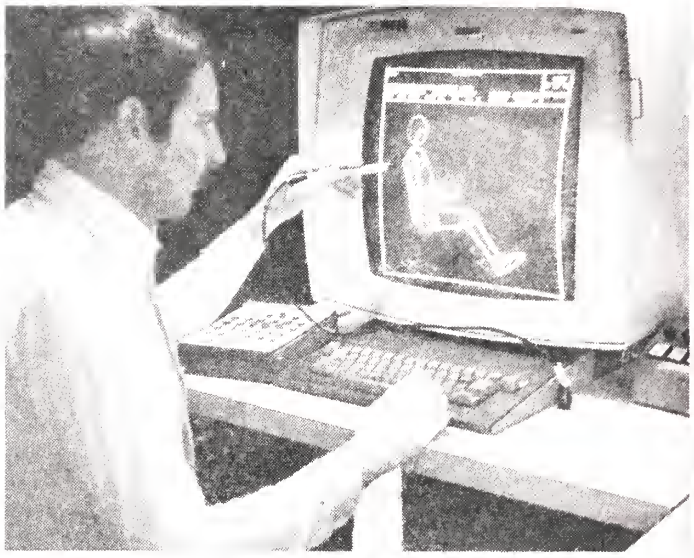
To operate Combiman, an engineer or a designer sketches the man-model on an IBM 2250 graphics display using a light pen. For hard-copy results, a Gould, Inc. electrostatic plotter is used to construct the physical characteristics mock-up on a computer printout.

Visualizing Workspaces

The three-dimensional mock- up allows designers to visualize man's interaction with his allotted workspace and how well a certain body type fits into that workspace. In many work areas, there are certain restrictions automatically imposed, such as body or shoulder harnesses or bulky clothing. The man-model can be used to evaluate these added inconveniences, McDaniel noted.

The printouts also show the worker's field of vision from a given workspace, allowing designers to determine whether there are any physical obstructions because of the workers size. This can be very important, according to McDaniel, who said that some car drivers can barely see over their steering wheels and consequently are not in full control of their autos. Keeping full control is even more important for a pilot, he said.

When determining what body characteristics fit best in a given workspace, an operator calls up a menu of items of body characteristics and uses the light pen to select various options.


Joe McDaniel uses light pen to reconfigure Combiman model.

The three-dimensional model can add or subtract characteristics and can be redesigned quickly and easily, McDaniel said. Combiman was designed to move in its workplace — its hands and feet move and its body swivels to allow engineers to determine ease of movement.

Construction Stages

The man-model is the product of three stages of construction, beginning with the skeleton. Combiman uses a link system consisting of 33 linear segments that function the same way parts of the human skeleton do, McDaniel said.

The Combiman system then "puts meat on his bones" by fashioning ellipsoids — three-dimensional geometric forms — around the joints of the link system. The size and shape of the ellipsoids are based on a complex combination of body dimensions and mass stored in the system.

Combiman was written in Fortran using IBM graphics and uses 400K bytes of memory, McDaniel noted.

Designers and engineers had previously used manually prepared drawing board constructions, and juggling all 90,000 physical dimension character sets required a great deal of skill. But the computer interface to the data base has greatly improved testing and evaluation times, McDaniel said, and what used to take several months now takes several seconds.

In addition to the time saved, use of Combiman has cut costs. Most manual models had to be altered — and thus redrawn — after the first tests, but now everything is done the first time on the graphics display, he concluded.

LOCATE
EVALUATE MINICOMPUTER SOFTWARE

NOW TWO VOLUMES

MINICOMPUTER SOFTWARE QUARTERLY
WITH
·Over 500 detailed program descriptions
·Indexed by Application — Hardware — Language

Subscription Includes
Base Volume Set + 4 up-dates
$85. US, Can (+5% Tax in Mass.)
$110. Foreign (prepaid only)

INTERNATIONAL MANAGEMENT SERVICES, INC.
215 Oak Street, Dept. C, Natick Mass. 01760

SHORT TERM LEASES
370/138,/148,/158, 370/145
3330's and OEM 3330's
360/30, 360/40,360/50,360/65's
Greyhound Phoenix ICA's

CALL US COLLECT

United States		
Austin	Ron Geil	(512) 451-0121
Boston	Tom Ryan	(617) 272-8110
Chicago	Dave Bays	(312) 298-3910
San Francisco	Dave Hyland	(415) 283-8980
International		
Canada	Don Maunder (Toronto)	(416) 366-1513
Mexico	Andrés Contreras	(905) 543-6850
Eurasia (U.S. inquiries)	Don Haworth (Dallas)	(214) 233-1818
U.K. Europe	Joe Gold (Geneva)	41-22-61-27-54
Austro-Asia	John Hallmark (Dallas)	(214) 233-1818
Non-IBM		
UNIVAC or	John Hallmark (Dallas)	(214) 233-1818
CDC only	Don Haworth (Dallas)	(214) 233-1818

GREYHOUND
COMPUTER CORPORATION
GREYHOUND TOWER PHOENIX ARIZONA [illegible]

NOW . . . All the benefits of Carpeting . . . . . with better STATIC PROTECTION than tile.

COMPU-CARPET™
High Performance
Anti-Static Carpeting
Pat. Pend.

COMPU-CARPET permanently anti-static carpets and COMPU-MATS™ • Eliminate static problems in computer and terminal areas • Protect sensitive electronic equipment • Meet IBM recommendations • Provide comfort and acoustical advantages of high quality carpeting • Carry a 5-Year wear and static warranty.

UTP UNITED TECHNICAL PRODUCTS, INC.
THE STATIC CONTROL PEOPLE

Dept. CW
23 Southwest Industrial Park
Westwood, MA 02090
(617) 326-7611

DataMaster II

THE COMPATIBLE FLOPPY!

Our DataMaster II Floppy Disk System can team up with almost any RS232 terminal — **including the Dataspeed 40™** — to give you cost saving data communications capability, versatile word processing and a lot of added storage

You can reduce ON-LINE costs by connecting the DMII to your printer or CRT terminal to store, edit and forward data to your computer. OFF-LINE it's an easy-to-use text processor for automatic letter writing, format and data merging, selective data retrieval and much more

So if you're using a **Dataspeed 40, Beehive, Diablo, Soroc, HP, Qume, LSI, Execuport, NEC, Teletype, TI, Tektronix, Hazeltine, Agile, Perkin-Elmer** you'll find the DataMaster II compatible with your terminal and your budget
Check us out...today!

wti **western telematic inc.**
2435 anne st., santa ana, ca. 92704 • (714) 979-0363

Zilog Manager Optimistic

Micro Field Booming, IBM Witness Testifies

By Connie Winkler
CW Staff

NEW YORK — The microcomputer industry has matured rapidly and is surprisingly sophisticated, easy to enter and booming, according to M. Dean Brown, manager of marketing research for Zilog, Inc. and IBM's 10th witness in the U.S. antitrust case here.

Zilog is one of the firms IBM contends have proliferated and are now vigorously competing with the computer giant.

Brown was on the stand for four days, a time considerably shortened because his direct testimony was in the form of a 27-page written statement. The written narrative technique is being tried to expedite the trial (See story on Page 14).

Zilog of Cupertino, Calif., is capitalized by the Exxon Corp., and in 1975 started selling semiconductor chips, Brown said. It has since graduated to manufacturing boards and microcomputers as well as the Z80 chip. The firm sees itself becoming a complete computer company with $1 million in revenue by 1990, Brown stated.

Super Chip

The Z80 chip, for which Zilog is noted, is an 8-bit, single-chip CPU capable of addressing 64K bytes of memory. That super chip has been incorporated into the MCZ 1/05 microcomputer, two boxes including a Z80 CPU chip and 64K bytes of memory and a floppy disk storage box with 600K bytes of memory, and the MCZ 1/20, a one-box version of the 1/05.

Brown spent his first day in court demonstrating the MCZ 1/05 and 1/20 and five applications: a business management system written in Cobol for a food distributor, a material tracking or inventory control system written in Basic, a bookkeeping system for a gas station, word processing system and an education program for graduate English students.

Brown engaged the whole court in poetry writing with the educational program.

Embryonic Stage

Marketing of the MCZ is in the embryonic stage, Brown said, and only five of the systems have been sold. The price ranges from $6,000 to $18,000.

The systems demonstrated in court included Infoton Corp. CRT terminals and a Diablo Corp. 1620 printer.

The MCZ 1/05 has the programming, I/O capability, instruction set and reliability of the IBM 360/50, Brown said. Early Eniac, Seac, Univac and Maniac machines at the Atomic Energy Commission, where he worked under contract, would take five months to do the processing a Zilog MCZ 1/05 could complete in one week, according to Brown.

On cross-examination, Brown clarified that while the MCZ 1/05 has many of the software capabilities of the 360/50, it has few of the hardware capabilities.

Future of Micros

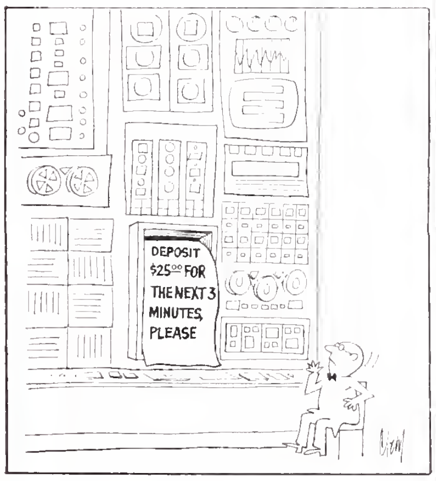
Brown also talked about the future of microcomputers, agreeing with Data General Corp. figures that microcomputers will account for $100 million in sales in 1978 and $300 million in 1980. While general-purpose or megacomputers will experience a 30% growth rate over the next two years, microcomputers will grow by 300%.

Brown, who wrote the software for Zilog's MCZs, testified about the growth of other microcomputer manufacturers in the Santa Clara, Calif., valley and about the offers Zilog had for funding. Brown is also planning his own software firm, Picodyne, to provide applications software to Zilog customers. One prospect he's excited about now is a gasoline station accounting program.

Brown's testimony was followed by a discussion of whether the government would allow IBM to introduce deposition statements from about 640 DP-related firms. IBM is expected to use the total of these firms' revenues to show that it does not have a monopoly share of the DP market.

The government objected that many of the depositions taken in 1974 do not define what is included as DP revenue. It decided, however, to allow the depositions to be presented at this time but to reserve its motion to strike the depositions at the end of the trial if IBM does not provide adequate foundation for them. IBM says it will do that.

The next witness, Raymond J. Dubrowski, a partner of Price Waterhouse & Co., is providing totals of the DP revenues reported in these depositions.



OPTIMIZER III.
Because programmers need all the help they can get.

Already expanding COBOL productivity at 300+ sites.

OPTIMIZER III is a new program product from Capex that provides COBOL programmers the information they need to develop and maintain programs with less effort. Although it was just introduced in mid March, OPTIMIZER III is already in use at over 300 sites. If you use any of the IBM OS, VS1, SVS or MVS systems, OPTIMIZER III can help you improve program quality, yet reduce programming time and effort. Here's how:

Easier Program Development.

OPTIMIZER III takes some of the mystery out of programming. It monitors program execution and provides verb-level execution counts showing exactly what the program does, what has been tested, and where problems exist. It even shows where CPU time is concentrated, to help focus tuning efforts. As a result, programs can be developed or modified faster, with less effort.

Faster Debugging.

By providing direct feedback about program operation, OPTIMIZER III helps spot otherwise hidden logic or performance problems. It actually flags many logic errors automatically [illegible] problems can be corrected before the program [illegible]

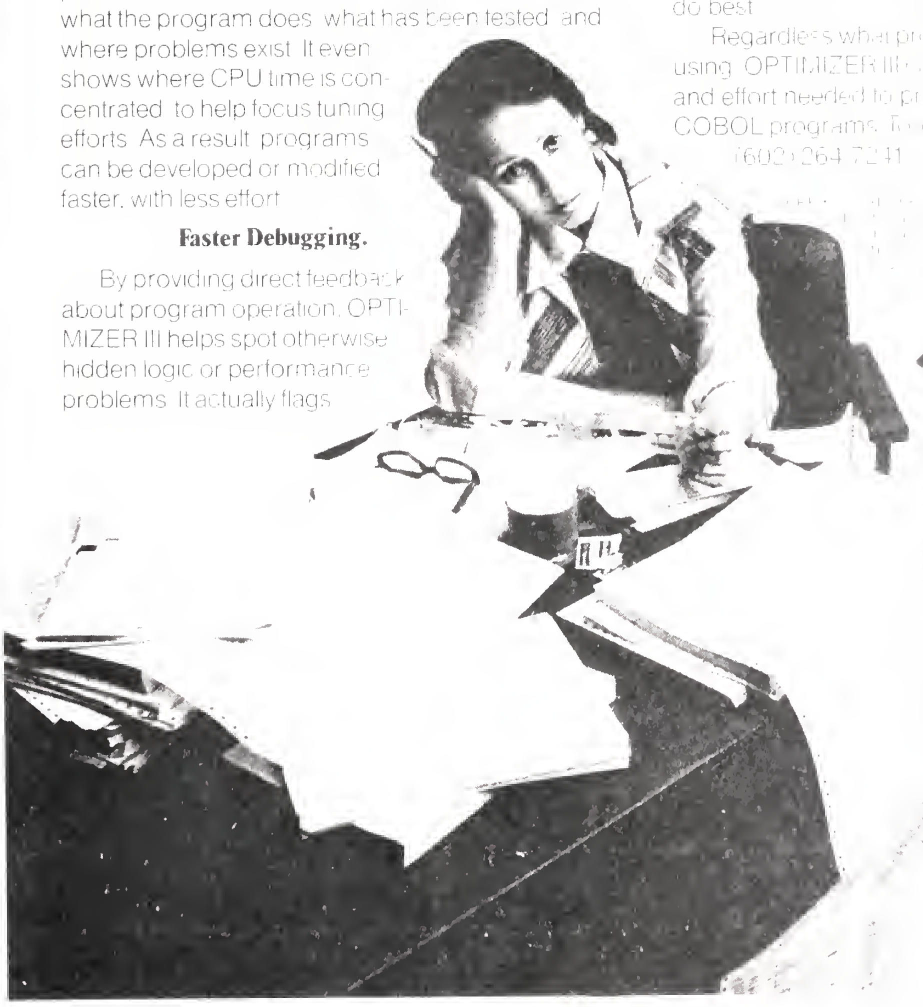
If the program does fail, even [illegible] *program* diagnostic information [illegible] COBOL oriented terms, virtually eliminating the need for cryptic, time consuming hexadecimal dumps. There is even a testing feature that [illegible] multiple program interrupts in a single run, so that fewer test [illegible] are required. Result: Debugging is faster and [illegible]

More Time for Programming.

With its powerful program [illegible] aids, and *automatic* program optimization, OPTIMIZER III allows programmers to concentrate [illegible] programming [illegible] do best.

Regardless what [illegible] using OPTIMIZER III [illegible] and effort needed to produce and maintain [illegible] COBOL programs. [illegible]
(602) 264-7241

capex



CRTs Feed News on Laws to Multistate Firms

By Marguerite Zientara
CW Staff

COLUMBUS, Ind. – Can't sleep because you're worrying about the status of a state legislative bill that could affect your corporation?

Up-to-the minute computerized legislative information is now available 24 hours a day in 11 states, thanks to a business centered here.

Legislex, Inc., an "early warning system" aimed primarily at major corporations, keeps terminal-equipped users in 11 states informed on such topics as taxes, the environment, computers and privacy, energy, workplace standards and product safety, according to its politically active founder, Judith Sly Head.

The topics are based on the stated needs of people whose organizations operate in more than one state. "For example, if you are a national company and you have factories in 10 states, you need to know what the different workmen's compensation laws are and what the states' Occupational Safety and Health Administration requirements might be," Head said.

State Versions Differ

In some cases, one set of national laws may have different refinements in the states' versions. This is especially true in the area of environmental issues, Head noted.

"People might be quick to assume – and I think mistakenly – that corporations want to stop the issuance of such laws," she said. "It's much more a case of finding out whether the law is one under which they can operate."

Four years as state president of the League of Women Voters demonstrated to Head that time is a critical factor in monitoring state legislative activity. During her term as president, businesses which were increasingly affected by state legislation asked her for data that was hard to come by.

"We could offer everyone our league state legislative newsletter or refer them to any of thousands of such available newsletters, but state legislation moves fast, and a corporation either had to have a physical presence in the state capital or rely on the numerous mimeographed sources that came through the mail a week late," she said.

After more than a year of researching the need for such a firm and of interviewing software companies, Head organized Legislex in September 1976.

Field Representatives

Legislex presently employs two field representatives in each of 11 state capitals, including New York, California, Illinois, Ohio and Pennsylvania. These representatives monitor selected topics from the time bills are introduced until they receive a gubernatorial signature or veto.

Monitoring a bill includes tracking its committee assignment and the action on it in each house, voting in each house and any action by a joint committee of each house relative to the legislation.

In addition to tracking, Legislex offers its clients a "probability of passage" that changes weekly. The field representatives predict passage possibilities, Head said.

Each night, after the legislative sessions, field representatives record their findings with equipment – supplied by the telephone company – for input the next morning into the Legislex data base in Columbus. Head declined to describe the data collection system, calling it "proprietary information."

The next morning the information is reviewed for "quality control" at the Columbus office and then input through a Texas Instruments, Inc. 742 programmable terminal to an IBM 370/168 computer. Users can access the information at "almost any hour of the day or night" from any interactive time-sharing terminal, Head said.

Since 1978 was a successful "testing year," the system will expand in 1979 to include 47 states, "all the continental states [whose legislatures] will be meeting." The system eventually will include Hawaii and Alaska.

In 1978 the cost to users was $2,000/year, but with the planned expansion, the price will rise to $3,200/year in 1979. Topics covered by the system will also increase as user need becomes evident, Head said.

Lower mailing costs -in the bag.

Moore Speedimailer® reduces handling costs... speeds your mailings on their way

Moore Speedimailer can eliminate your folding, inserting and sealing labor completely. You save purchasing separate mailing envelopes, forms, return envelopes and return inserts. Save storage, inventory and handling costs too. Eliminate space needed for equipment and personnel to fold, insert and seal 3 to 6 separate mailing components.

Moore Speedimailer combines your forms and envelopes in a single unit. Each form goes from your computer printer and detacher directly into the mail. Your mailings go out faster which helps speed cash flow or return of requested information.

Many companies are already reducing their costs of mailing: invoices, credit memos, purchase orders, reorder forms, shipping notices, acknowledgements, statements, collection letters, accounts payable checks, payroll checks and other forms.

Find out how much money Speedimailer will save you. Call or write for our Mailing Systems Analysis Booklet and Speedimailer samples.

MOORE BUSINESS FORMS, INC.
1205 N. Milwaukee • Glenview, IL 60025 • 312/297-1300

NEW
LOW-COST, HIGH-SPEED ACOUSTIC COUPLER

The Model 710 is one of the most advanced and reliable Acoustic Telephone Couplers on the market today. And it's priced at only **$165** each in single-unit end user quantities. With the 710 you get a data rate of 0-450 baud combined with 20 MA current loop and EIA (RS232C) terminal interfacing plus acoustic and hardwire coupling (optional) and half or full duplex operation. The Model 710 is an advanced coupler in everyway with only one-half of the internal components normally used due to the latest LSI technology. The result is ultra-high sensitivity and maximum flexibility for time-sharing and data communications applications.

OEM Re-sale quantity discounts available from stock.

Write Dept. 128 or
call (602) 252-2083 Collect.

OMNITEC DATA
"New Dimensions in Modems"
2405 South 20th Street • Phoenix, Arizona 85034

System Aids Prosecutors

Developers of Promis Win Rockefeller Award

By Tim Scannell
CW Staff

WASHINGTON, D.C. — Charles Work, a local attorney, and William Hamilton, president of the Institute for Law and Social Research here, were recently named cowinners of the Rockefeller Public Service Award for their development of the Prosecutor's Management Information System (Promis).

The $10,000 tax-free award was established under the sponsorship of the late John D. Rockefeller III and is administered by Princeton University's Woodrow Wilson School of Public and International Affairs.

A committee of representatives from business, education and government selects a number of recipients each year. The decision is based on the committee's evaluation of an individual's past work in the public interest, a spokesman said.

Promis was developed in 1971 and is used by more than 100 courts and judicial systems across the country. The software package is compatible with a variety of hardware configurations and essentially catalogs every bit of information that passes through a state's superior, federal or district courts.

More important, prosecutors can use the system to identify "career criminals" and multiple offenders whose cases may be buried deep within the court's already crowded judicial calendar.

Habitual criminals with cases pending are noted on a separate listing that details their previous arrests and convictions as well as any other charges for which they may be out on bail, probation or parole.

Such defendants "are usually most chagrined when they learn they've been designated as career criminals," Work stated. "They know they're not going to walk the bases and their case is going to get the attention it deserves."

Thus far, 6,500 multiple offenders have been fingered by Promis, and 94.7% of them have been sentenced to an average of more than 15 years apiece.

Study of Judicial Process

The computerized system has also revealed a number of unflattering facts about the American judicial process. Last year, a study of the information gathered from a number of Promis-enhanced court systems showed that between 50% and 77% of all the major felonies committed within the U.S. were dismissed. "They aren't plea-bargained away, they're just washed out," Work claimed.

Witnesses and victims are less apt to testify as time passes, Work said, which means the more time that is wasted waiting for a trial, the smaller the likelihood that an individual will be prosecuted for the offense.

Promis statistics showed that Milwaukee had an average arrest-to-case disposition lag time of 229 days while Detroit's was 224, Los Angeles' 125 and New Orleans' 116.

In addition, the study revealed that of the nearly 100,000 felony arrests made each year in New York City, a little more than 3,000 are prosecuted by a jury trial. The other 97,000 cases are either dismissed, diverted or disposed of through plea bargaining.

"The American public thinks that most cases are disposed of through plea bargaining but that's not true," Work stated. "The way that most cases are disposed of is that the prosecutor just drops them."

The effectiveness of the Promis package recently prompted Law Enforcement Assistance Administration (LEAA) officials to award $60 million in grants to introduce the system in 33 major cities and urban ares in New York, New Jersey and Michigan, Work said.

"This is the first time in the history of the American criminal justice system that there is a data base that can be researched on a cross-city basis," the attorney said, "and startling things are coming out of the research and the data that is bounced between cities."

Hamilton and Work were two of seven individuals selected by the Woodrow Wilson School's committee to receive the Rockefeller Award. Others cited were the Rev. Jesse Jackson, national civil rights leader, for his efforts in Operation Push; Stanley Sporkin, director of the Securities and Exchange Commission's Division of Enforcement, for administering justice and reducing crime; Margaret Snyder for her activities in international cooperation; and Benny Bailey and Warren Stumbo for improving health services and controlling health costs.

The official awards presentation will take place here on Dec. 5.

UNIX*

Sublicenses Enhancements
Support Typesetting

RLG Associates, Inc.
11250 Roger Bacon Drive
Reston, Va.
(703) 471-1106

**UNIX is a trademark of Bell Laboratories*

EDP professionals have a word for the new Wang VS computer.

Richard Berger, Vice President and Data Processing Manager, Bughaus, Inc., a Volkswagen service center network headquartered in Hartford, Conn.

"Because we had been using a computer — the Burroughs B1700 — with card input sequential files and no video displays, we suffered long delays and storage constraints.

"Now, with our Wang VS system, storage is virtually unlimited, and we simply recall a screen load of information on the CRT to make a change in seconds — all of this without interrupting our normal flow of work.

"We've put everything in our business onto our VS system, including payroll, accounting, sales and wholesale and retail inventory control. And we did it in 90 days without changing languages and with only minor modifications in almost 90 COBOL programs."

"We are absolutely amazed at the throughput rate we've achieved with our Wang VS. On our very first job for one of the country's largest student insurance agencies, the VS arrived in Pittsburgh on December 23 and was completely installed and operational on-site on February 15 with 61 programs written, debugged and tested — all by only two people — and not a single line of code had been written until the machine came in the door.

"The VS really fulfills all of our requirements, particularly in areas where other systems are weak: cost/performance, language-availability, user-utility software.

"I think the real key for the DP manager is the utilities available with the VS, its speed and its interactive COBOL compiler. These three things combined make for a very powerful tool."

J.P. Scott, Data Processing Manager, Aptech Computer Systems, Inc., Pittsburgh, Pa.

Kenneth W. Cakebread, Manager of Data Processing. Trans-Air Forwarding and Brokerage, Inc., Inglewood, Calif.

"I had 30 days to convert about 220 programs from our old batch-oriented Honeywell 62 system to our new Wang VS system. Not only did I do it. Thanks to the programming power of the VS I actually came up with more.

"Before we converted to the VS, the biggest problem we had in the accounts receivable area was misapplying cash. No more. Now, by capturing current information and keying it into the computer from a workstation, we're able to sort out potential problems long before they get to the accounts receivable stage. And with Wang [illegible]

EDP professionals in more than 100 companies are singing the praises of the Wang VS. And for good reason.

The VS is a remarkably sophisticated, fully expandable virtual storage computer designed to provide maximum interaction in a mainframe environment.

The VS provides for distributed data processing, thus avoiding costly consumption of mainframe resources. It's fast, responsive, [illegible] and can support up to 2.3 billion bytes of on-line storage. What's more, the VS speaks EDP people's language: COBOL, BASIC, RPG II and ASSEMBLER.

We also think you'll appreciate how simple the VS is to operate. In fact, because of its level of sophistication, it can be operated by people with little or no computer-related training or experience.

One more thing: the entry level price of the VS is under $50,000. Which is perhaps the most remarkable thing of all about this computer.

For more information on the VS, return this coupon to Wang Laboratories, Lowell, MA 01851

WANG
Computer and word processing systems.

DP88/CW1127

Better Communication on Data Flow Urged

CW Washington Bureau

WASHINGTON D.C. — A recent study by an American Federation of Information Processing Societies (Afips) panel concluded that better communication is needed between U.S. agencies that formulate policies on transborder date flow and U.S. businesses and industry.

The panel recently submitted 12 "Observations on Transborder Data Flow" to the State Department. The observations, which do not constitute an official Afips position statement, included a number of suggestions to assist U.S. policymakers. The panel suggested:

- The first step is to define clearly the problems in transborder data flow. A statement of U.S objectives should then be developed so specific questions can be isolated.
- It is important to separate national concerns for individual privacy and national security from economic concerns on the part of some nations for increasing or decreasing present imbalances in data flows.
- Computer technology itself can solve problems that lend themselves to technical solutions. For example, if there is a fear that access to vital data could be denied when it is processed and stored in transnational systems, local copies of the files could be maintained and an inexpensive, "bare-bones" processing capability could be offered locally to handle at least the most necessary DP tasks.
- The U.S. should seek participation in multilateral agreements.
- Industrialized countries should consult developing nations in drafting regulation agreements. Agreements formulated otherwise are likely to spark "adverse reactions from developing nations and Communist bloc countries."
- An analysis of experiences of international companies with nations that do not want certain data files transferred abroad might be helpful to know which countries "do not want certain data files processed abroad, period."
- One must look beyond the privacy protection issue to weigh the economic and scientific issues and the implications of restrictions on non-electronic information transfer. Transborder data flow issues might cause "significant adverse effects on U.S. industrial growth as a whole."
- The data security technologies of individual countries cannot be depended upon with confidence by other countries "unless the techniques involved are published in open literature so they can be fully analyzed and validated by the countries [and] scientific and technical communities. Then it would be more likely that ensuing legislation would be less restrictive."

Centre Urges Week Honoring UK Informatics

MANCHESTER, England — Charging that "our overseas competitors are building their achievements on our information," National Computing Centre Director David Firnberg recently called for a British National Informatics Week.

Firnberg made his remarks at a recent seminar on "In-House Computer Solutions to Information Handling" presented by the Institute of Information Scientists and the British Computer Society.

Firnberg stressed that "national awareness is needed" of the information society opening up in the UK and in the world.

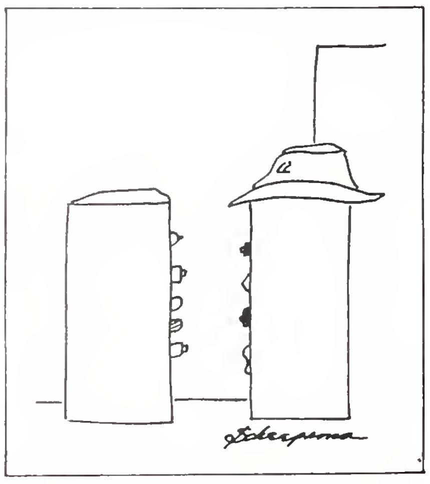
Study on CRT Hazards

The center has also announced a study it will conduct arising from the current interest in possible health hazards associated with the use of CRTs. The study will lead to the publication of recommendations and advice regarding the selection, installation and use of CRT terminals.

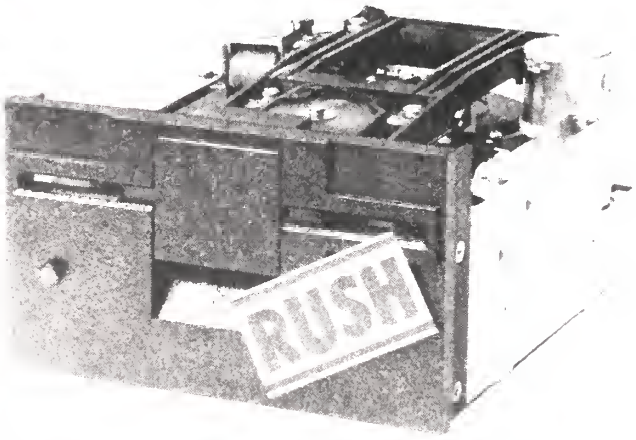
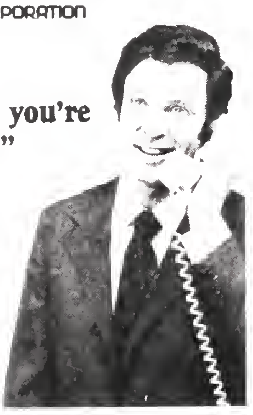
In collecting information, the center is seeking case histories of both good and bad experiences from users of CRT equipment. Anyone interested in providing data can contact Paul Wilson, National Computing Centre, Oxford Road, Manchester M1 7ED, England.

In another area, the center recently created a Technical Advisory Committee to advise its director of "significant computing developments and their likely effects" to help him plan future activities.

The committee, which will meet bimonthly, will examine the implications of Viewdata at its next meeting, emphasizing its likely interaction with DP activities.



'Yes, I'm a Texas Instrument; How Did you Know?'

Floppies fast.

Call (800) 423-5152.

Call us today. And this microfloppy will be on its way.

It's our FD200 Microfloppy Disk Drive unit. It uses standard 5¼-inch diskettes. Its double-density recording capability means a lot of storage in very little space. And it's ready and waiting, on our shelves, so we can deliver in very little time.

You can see from its vital statistics on the right: the FD200 holds its own with any comparable competitor.

And it's fully compatible with the Shugart SA400.

But this one's made by Pertec.

So you get Pertec's experience: we were pioneers in computer peripherals.

You get Pertec's worldwide reputation for high quality and low operating costs. You get Pertec's strategically located field service.

And, you get floppies fast.

Pertec FD200 Microfloppy Disk Drive	
Media	Standard 5¼-inch diskette
Tracks per Inch	48
Number of Tracks	40 per side
Dimensions	
Height	82.55 mm (3.25 inches)
Width	146.05 mm (5.75 inches)
Depth	203.2 mm (8.0 inches)
Seek Time	25 msec track to track
Head Settling Time	10 msec (last track addressed)
Head Loading Time	75 msec (maximum)
Error Rate	1 per 10⁹ recoverable (maximum) 1 per 10¹² nonrecoverable (maximum)
Head Life	20,000 hours (normal use)
Media Life	3 million passes on a single track
Transfer Rate	125/250K bits/sec
[illegible]	
Single density	125,000 bytes/side
Double density	250,000 bytes/side
Recording Mode	FM single, MFM double density

Just give us a call.

Even if you're not quite ready to order, but you want more information on the complete line of Pertec floppies, call (800) 423-5152. In California (213) 996-1333. In England 582115.

Or write us at Pertec Computer Corporation, PERTEC DIVISION, 21111 Erwin Street, Woodland Hills, California 91367.

PCC PERTEC COMPUTER CORPORATION
PERTEC DIVISION

"Pertec, you're perfect!"

Pertec Floppies

COMPUTERWORLD

. . . the one weekly newspaper that's designed to fulfill your unique "need to know" . . . the one newspaper that can give you all the current information you need to benefit you, your organization and your career progress . . . 52 weeks of incisive news, commentary and special reports . . . subscribe today, use the attached postage paid order form.

☐ Please enter my subscription (details on back)

☐ I'm already a subscriber, but I'd like you to change my
  - ☐ address
  - ☐ title
  - ☐ industry
  - ☐ other

My [illegible] [illegible] [illegible] on the other side

Put old label or label information here

[illegible] COMPUTERWORLD [illegible] RATES United States – $25 Canada, Central & South America – $35
Europe and Near East – $75 Other Foreign – $125 (Airmail Service)

MC Only: First four digits above your name

☐☐☐☐☐☐☐☐☐☐ ☐☐☐☐ ☐☐☐☐

[illegible] card holder's signature ______________________ Expiration Date ______________

First Initial		Middle Initial		Surname	
Your Title					
Company Name					
Mail To:					
City		State		Zip Code	

Address shown is:
☐ Business
☐ Home

☐ Check here if you do not wish to receive promotional mail from *Computerworld*

☐ Check here if you're interested in receiving information on *Computerworld's* Index

PLEASE CIRCLE 1 NUMBER IN EACH CATEGORY

BUSINESS/INDUSTRY

10 Manufacturer of Computer or DP Hardware/Peripherals
20 Manufacturer (other)
30 DP Service Bureau/Software/Planning/Consulting
40 Public Utility/Communication Systems/Transportation
50 Wholesale/Retail/Trade
60 Finance/Insurance/Real Estate
70 Mining/Construction/Petroleum/Refining
75 Business Service (except DP)
80 Education/Medicine/Law
85 Government – Federal/State/Local
90 Printing/Publishing/Other Communication Service
95 Other

TITLE/OCCUPATION/FUNCTION

11 President/Owner/Partner/General Manager
12 VP/Assistant VP
13 Treasurer/Controller/Finance Officer
21 Director/Manager of Operation/Planning/Administrative Service
22 Director/Manager/Supervisor DP
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
41 Application Engineer
42 Other Engineering
51 Mfg Sales Representative
52 Other Sales/Marketing
60 Consultant
70 Lawyer/Accountant
80 Librarian/Educator/Student
90 Other

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

CIRCULATION DEPT. 97 Washington Street Newton, Mass [illegible]

Detach here, fold, and place in post-paid envelope attached through binding.

Bartering Service Based On Terminals Tied to Mini, Works Like Charge Account

By Marcy Rosenberg
CW Staff

LOS ANGELES — An eye for an eye? Well, not exactly, but the age-old concept of trading is alive and well at a Los Angeles-based company which has come up with a computerized bartering service.

The firm, Mutual Credit, allows its clients to use their memberships like charge accounts to buy and sell each other goods and services with no cash changing hands, according to Thomas Skala, president.

While there are other bartering clubs around, Mutual Credit claims to be the first to tie the concept of bartering with today's credit card system and modern computer technology.

For its own recordkeeping, the firm uses a central processor at its headquarters here to handle inventory control, billing, payroll and accounts payable and receivable. The CPU backs up microcomputers which perform similar accounting functions at each of the firm's 20 branch offices.

The company also provides terminal services to its clients for 24-hour, seven-day-a-week direct communications with its Credit Clearance Department and/or Customer Service Department on a toll-free basis. Members can rent terminals for a $50 installation fee and $10 monthly service charge.

Payment in 'Futures'

Skala outlined how his financial service works. If a lawyer, for example, joins Mutual Credit, he deposits $200 in an account, receives a Mutual Credit Moneycard and is added to the member and service directory that is distributed to all members.

If a member travel agent needing legal services sees the lawyer's name in his directory and decides to use him, the agent would "pay" for, say, a $400 legal fee with his card.

Payment, however, is not in cash, but in "futures," each of which is worth $1. The attorney's account in the main computer is then credited with 400 futures (plus the 200-future deposit) that he can "spend," either for services from a professional or goods from a store.

The travel agent's account is debited 400 futures, meaning he agrees to provide $400 worth of travel services to any other member of the trading pool.

The price of barter services is set by the trader, Skala said. Mutual Credit charges the buyer an 8% service charge for each transaction and the seller 5% to cover bookkeeping and directory publishing costs.

IBM 360 Traded for Mini

Until a year and a half ago, Mutual Credit used an IBM 360/30 "which was set up for batch processing and was shared with another company," Skala noted. "With the IBM system, we had to do credit holds manually and also had to keypunch to get a computer printout which was not up-to-date."

About that time, Mutual Credit was acquired by Sntcor Corp. of Las Vegas, which, through a subsidiary, Sntcor Electronics and Communications, assembles equipment for credit clearance service and electonic funds transfer applications.

Sntcor built a 1.2G-byte minicomputer system for Mutual Credit that "gave us on-line capability and was faster than the 360/30," Skala said.

Called the Sntcor 15, the system uses a CRT terminal for input and output and disk files "so we can add more memory," according to Skala who declined to name the firms that supplied the hardware. Sntcor, he noted, manufactured the printed circuit boards and interconnect equipment.

At all branch offices, Mutual Credit installed 48K-byte Sntcor 10 microcomputers which store the regional customer information needed to perform inventory control and accounting procedures.

If any branch's member list grows to the point that "the application is bigger than the computer's memory capacity," Skala said, "the operator can push a button to tie in his Sntcor 10 to the Sntcor 15 to get additional storage capacity on a time-sharing basis."

In about a month, Mutual Credit plans to upgrade the 15 to allow clients to communicate directly with the computer by push-button telephone. Clients will then be able to dial into the computer through a special toll free number.

Once connected, a member could find out his present balance by keying in the word B-A-L-A-N-C-E and his account number or could locate a member for any service he needed by keying in works like G-A-R-A-G-E B-O-S-T-O-N or H-O-T-E-L- L-A-S-V-E-G-A-S.

The computer will be able to reply in English over the phone to supply the desired information, according to Skala, who declined to give specifics about how the system will be upgraded.

Direct-Line Terminals

Mutual Credit's terminal service uses Sntcor terminals which are direct-line communication devices that resemble push-button telephones, Skala said.

The Sntcor 1 terminal has a button that ties it to the firm's Credit Clearance Department, a Sntcor 2 contains a second button to tie into Customer Service.

Among the other terminals rented to clients is a Sntcor 4 that looks like an electronic calculator with a slot to take not only the Moneycard, but also most major credit cards. The user (or seller) can slide in the potential buyer's card and key in the amount of purchase.

The terminal reads the buyer's account number from a magnetic stripe on the card and, linked to the main computer, can verify the card and display the current balance in about 10 seconds, he noted.

Skala, who works in cooperation with several major credit card companies and banks, said Mutual Credit plans in about 30 days to make the Sntcor 4 and several other terminals available to the general public. Prices will be about $5,000 and monthly rental fees will range from $10 to $50.

NCR SLASHES PRICES

Century & Criterion users see up to 70% discounts from NCR.

FOR EXAMPLE:

Up to 20% on C[illegible]
Up to 60% on C[illegible] and [illegible]
Up to 70% on C[illegible]

WHO QUALIFIES?

NCR users who obtain [illegible]
Computer Enhancement Corporation (CEC)

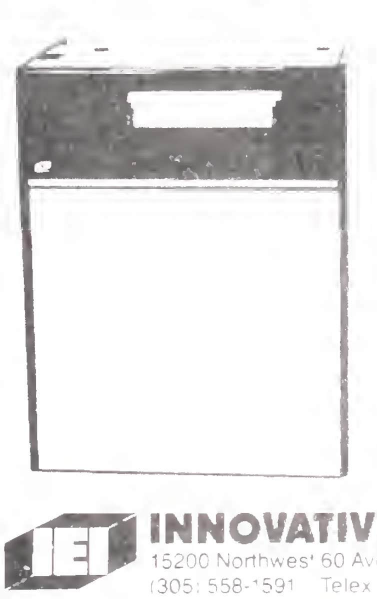
HOW DO I GET MY "SPECIAL DEAL"?:

Show your CEC quotation to [illegible]
He will then obtain a matching [illegible]
NCR Dayton.

WHO DO I CONTACT FOR MORE INFORMATION?:

NCR
OR
COMPUTER ENHANCEMENT CORPORATION
3189-E Airway Avenue
Costa Mesa, California 92626
714/754-0521

THIS PRINTER IS THE ULTIMATE OR THIS AD IS A LIE!!!



The printer [illegible] Teletype™ Corporation [illegible] more than 40,000 [illegible] The 80 or 132 [illegible] clear copies. [illegible] plug compatible with Centronics, Dataproducts, current loop, and RS-232C [illegible]

☐ 300 LPM-adjustable forms
☐ Fully formed characters
☐ Service available from Teletype™ Corporation
☐ Installations: DEC, DG, HP, CA, GA, Intel, Prime, Wang, GE, SEL, Datapoint, IBM Tandem, Microdata
☐ $4,250 (80) — $4,950 (132)
☐ Delivery: stock to 30 days

INNOVATIVE ELECTRONICS INC.
15200 Northwest 60 Avenue • Miami Lakes, Florida [illegible]
(305) 558-1591 Telex 807121

☐ Yes, I am convinced this ad is not a lie, send me information

Name Title
Company
Street
City State Zip
Phone Ext

Editorial

The Untapped Resource

The computer field has often been described as young and vibrant with plenty of opportunity for everyone, yet it seems plagued with some of the same sex discrimination problems common in other fields.

This "represents a severe loss of scientific talent," as Joan Callanan, manager of the National Science Foundation's (NSF) Women in Science Program, has pointed out [CW, Nov. 20].

Men outnumber women by more than four to one in upper echelon DP jobs (systems analyst or above), according to recent surveys, and the percentage of women receiving degrees in the computer sciences is even lower.

Sex discrimination is, of course, not a new phenomenon but its presence is more surprising in the computer field than in more tradition-bound areas of society.

After all, many of the pioneers and real leaders in the computer profession have been women — Grace Murray Hopper and Jean Sammett come readily to mind.

But perhaps the opportunities for women were better when the field was brand new and little understood by most people, and as it became an established discipline, it became more like society at large, adopting the discriminatory hiring and promotion practices of American business.

This type of discrimination is not only illegal now, it is just plain stupid.

Data processing departments only hurt their overall effectiveness when they discriminate against anyone for any reason. Ignoring talent or relegating it to the backwater of the department hurts the entire operation. In this business, perhaps as in no other, talent should be the only criterion for promotion and success.

As a first step toward clearing up the problem, companies and DP departments within companies should evaluate their own procedures for hiring and promotion and eliminate any built-in biases.

Another way to help increase the pool of talented women would be to support the NSF's Women in Science Program, which sponsors workshops around the country to provide career information for women and advice on preparation for jobs in specific fields.

In the past, these workshops have featured women panelists and participants from industry and government, Callanan said, and she urges companies wishing to participate to contact her.

If DPers get involved in such efforts, we may be able to attract more women to our field — and DP needs all the talent it can muster.

Data Past

Five Years Ago
Nov. 28, 1973

WASHINGTON, D.C. — With the unanimous vote of the Federal Communications Commission, Packet Communications, Inc. (PCI) gained approval to become the first company to provide packet-switched services to users.

—

LOS ANGELES — IBM countersued California Computer Products, Inc., charging that the firm had monopolized the market for digital plotters and had therefore kept IBM from entering that market.

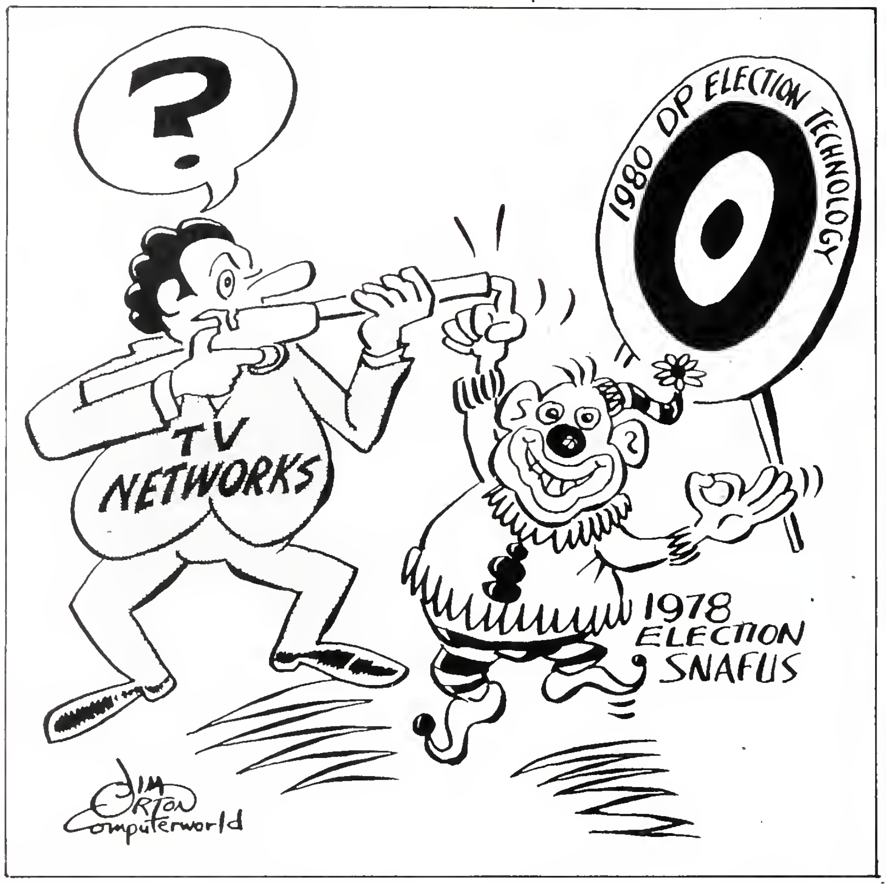
The suit came in a week of hectic legal activity by the IBM legal team, in which it dealt with all of the members of the plug-compatible peripherals market presently suing IBM.

Eight Years Ago
Dec. 2, 1970

DETROIT — After two trouble-filled elections, the city's Common Council voted to "dump" the use of punch cards and ordered the city's attorneys to bring suit in the amount of $1 million against Datamedia Computer Services, Inc., the Dallas-based firm that had brought punch-card voting to Detroit.

— — —

WASHINGTON, D.C. — A spokesman for the Internal Revenue Service (IRS) announced that the IRS, upon request, would compute the tax of any taxpayer who earned less than $20,000 and took the standard deductions on the 1040 form. The aim, the service said, was to reduce the errors officials found on 3.6 million of the 78 million returns filed for 1969 income.



Letters to the Editor

Ability Not Guaranteed

In his letter in *Computerworld* [Oct. 30], Ben E. Olive, associate general counsel for NCR Corp., stated that NCR customers' "ability to resell equipment is not dependent on NCR's goodwill but is guaranteed."

Perhaps he can explain how this is true when NCR attempted to establish a maintenance policy last year which stated: "It is our policy, therefore, that Field Engineering Division will not service products or equipment sold or leased by organizations other than NCR unless a corporate contractual business relationship exists between NCR and the third party. This policy pertains to products which may be similar to or exactly the same as that marketed directly by NCR sales representatives."

DP equipment without maintenance is worthless. NCR could be the only beneficiary of such a policy. Fortunately, NCR users were informed of this attempt and raised such a furor that NCR backpedaled through two more versions to the present watered-down version of the maintenance policy.

Even this latest version issued in October of last year provides no guarantee that users may sell their NCR equipment and have NCR maintenance continued.

I am sure NCR users would like to see the guarantee that Olive alluded to. So far, they have only seen attempts to guarantee that only NCR would be capable of selling used NCR equipment.

G. Cimo
Costa Mesa, Calif.

Surprised at Report

I was surprised to read "Don't Be Lulled Into False Security by Minis" [CW, Oct. 23]. Daniel C. Zatyko of Basic/Four Corp. was quoted as saying that we have replaced a large mainframe computer with three minicomputers and that we use a service bureau, none of which is true.

The University of Alabama Hospitals has an IBM 370/148 with an IBM Series/1 minicomputer attached. We have not downgraded our system nor do we plan to do so.

Mary Nell Spraberry
Assistant Administrator
Health Data Systems
University of Alabama Hospitals
Birmingham, Ala.

Zatyko responded that during his presentation at the Fifth International Information Management Exposition and Conference he was referring to an article published in *The Office* in September, 1978 about the University of Alabama. At the same time, he neglected to remove one of the slides he was showing which described a general solution to a hospital system. Inadvertently the two subjects became overlapped.

According to Zatyko, the University of Alabama Hospitals has two Basic/Four Model 400 computers which communicate with an IBM 360/65 at the Computer Service Corp. in Birmingham.

The two Basic/Four systems, Zatyko said, are installed in the Department of Medicine and the Department of Obstetrics and Gynecology. Ed.

Computerworld welcomes comments from its readers. Preference will be given to typed, double-spaced letters of 150 words or less. *Computerworld* reserves the right to edit letters for purposes of clarity and brevity. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

The Human Connection

AT&T Putting Energy Into Marketing Plan

By Jack Stone
Special to CW

Seeing John deButts meander down that hallway on national TV sparked my interest in what AT&T was up to. Then the ads for the Dimension line of electronic PBX "systems" extended my curiosity. But it was the article in the September issue of *Fortune* magazine ("Selling at AT&T Is No Longer Mickey Mouse") that encouraged me to develop this column about the significance of AT&T's changing marketing strategy.

In a nutshell, the article said that legal and regulatory decisions during the last decade have given rise to considerable competition for the grande dame. As a result, Ma Bell has come out of the closet with a fighting posture, telling the industry and the marketplace that she will be, in fact, responsive to customer needs and that AT&T will, in the words of Chairman deButts, become "a marketing organization."

I don't know how you look at it, but to me, when a huge company — about four times the size of IBM in terms of assets and employees, with a technical competence which supports, only as one example, a communications network of upwards of 150 million terminals (the U.S. telephone system) — says, in effect, that past marketing efforts have been fun and games and that now it's going to take it seriously, well, watch out!

It simply has to happen that Bell's actions will create colossal changes in the marketplace as its new marketing philosophy takes hold.

I had the opportunity to interview Philip F. Pagano, a marketing manager at the AT&T "1776" facility in Morristown, N.J., who is responsible for implementing one of the many programs that constitute the redirected Bell System marketing thrust.

Q: What is the central theme of your company's recent marketing pronouncements?

A: It is simply said in our new slogan, "The System is the Solution." Underlying this statement are Bell System action programs designed to replace its old image as a supplier of communications equipment and services with one that is much more appropriate: a supplier of systems solutions for the communications problems of business, government and residence customers.

Major changes are taking place in all departments, including engineering, operations and maintenance, to help ensure a coordinated, corporatewide response to customer requirements.

Specifically, AT&T has just announced a major corporate reorganization that represents a radical shift away from its traditional alignments of 60 years. Now we are structured into three segments: business, residence and network services. Each segment brings together into one self-contained unit, for the first time, all the people and functions needed to properly serve its customer set.

Q: What is specifically happening in the marketing arena?

A: The corporation began studying the marketing organization nearly five years ago when it was determined a new approach was needed in the long term if we were to meet the growing and complex communications requirements of our customers.

A major milestone was reached last year, when AT&T released a set of guidelines, termed the "Bell Marketing System," for streamlining marketing operations for business customers.

This system emphasizes industry specialization of the marketing force. It recommends team marketing, in which the account executive receives strong support from technical specialists permanently assigned to the field marketing organization.

It brings our marketing operations up to date by addressing such matters as revenue planning and commitment, account planning and implementation and the measurement and control of marketing operations.

Q: What is your particular area of responsibility?

A: My group has the task of developing the "delivery system," a comprehensive set of plans and programs whose objective is to assure the marketing success of major new products and services.

We work closely with our associated companies and AT&T departments to make certain new offerings are announced and supported in a highly professional manner.

In many ways the delivery system helps prepare the sales team to function as a true communications problem-solving operation.

Q: How would you characterize the progress the Bell System has made toward its new marketing goals?

A: Well, for a company the size of ours, I feel we've made great progress in the past several years. But with the recently announced reorganization, I believe our marketing effectiveness will rapidly accelerate.

Letters to Stone should be addressed to him at Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.

The Taylor Report

Managers Must Delegate Security-Related Tasks

By Alan Taylor
Special to CW

At this month's New England Internal Auditors' EDP Clinic, one auditor asked me what to do when management ignores or brushes off repeated reports of an unprotected computer site.

The security question has two sides, the obvious and the historical. A computer site that allows uncontrolled access is an obvious risk, and auditors are supposed to report such risks to management.

But after the report arrives on the manager's desk, few auditors can point to a prior case in which ignored risks resulted in a major loss. Historically, from management's viewpoint, DP audit literature is full of cries of "Wolf!"

Most computer sites I see are unprotected in any formal sense, and a DP auditor would regard security as inadequate.

Whose Responsibility?

What is really at issue here is not that the site is unprotected but that when the auditor points out to management that protection is needed, he gets a lot of flak. In essence, the DP department is saying, "This is none of our concern."

It is generally believed that the function of the DP director is to get the job done with the resources and facilities supplied to him. It is not the director's job to change sprinkler systems, for example; this is often the responsibility of the landlord's building maintenance department.

"I was hired to get the reports out and see that new systems are implemented," is the routine and understandable director's comment. But such a response is no help to the DP auditor.

One way to deal with such a brush-off is to track back in history to discover just who put the computer room over a fire hazard — like the cafeteria kitchen — without a sprinkler system. Perhaps the computer room opens onto a stairwell that people can enter without being challenged; who planned it that way?

From experience, I would say that approach rarely works. The building maintenance department will say the computer people agreed; the computer people will insist it was the only place where they could get in the equipment and that no one told them a kitchen was going to be put in under the tape units.

Any auditor who willingly

(Continued on Page 22)

Reader Commentary

Executives Taking Stock Of Future DP Situation

By Phillip G. Elam
Special to CW

Virtually no one could foresee the impact commercial data processing would have on the American business community when it made its debut some 25 years ago. While the past is not that important to us, it is important to review the last two or three years and then take a look toward the future.

In 1976, revenue from computer manufacturing and services was $38.4 billion. That accounted for more than 3.2% of the gross national product. Experts are now predicting $64 billion in revenues by 1981, and 1985 will bring revenue levels to 8.3% of the gross national product.

Probably the most alarming factor in these rising costs is related to the people cost of technology. Some 10 years ago the average cost per line of program code was $6 to $7. Many organizations are now citing costs as high as $71 for the same line of code.

Budgetary analysts say that 10 years ago, DP costs were limited to 1% to 3% of the overall corporate budget. Costs have now risen to between 12% and 15% in many organizations. Hence, upper echelon executives are taking a much more active interest in what their respective organizations are getting for their DP dollar.

One industry expert has evaluated the cost of data processing in an effort to determine where organizational money is really being spent. His findings were startling in that up to 70% of the average DP budget is directed toward people costs in some organizations.

And the end is not in sight. If this trend continues, people costs could go as high as [illegible] of the overall DP budget by 198[illegible], making DP the world's most labor-intensive industry, with the possible exception of [illegible].

But hardware costs are [illegible] too. True, the cost of [illegible] [illegible] half may be [illegible] instruction [illegible] amount of [illegible] increase [illegible] lion spent on [illegible] $20 billion [illegible]

[illegible]

BUY LEASE

★ FAST DELIVERY
Call Today . . . Use It Tomorrow!

★ FLEXIBLE TERMS
Month-to-Month after 3 Months!

NEW PRICING ON LS120 & HAZELTINE CRTs
DEC: VT50
HAZELTINE: 1000, 1200, 1400, 2000, 3000, CASSETTE
LEAR SIEGLER: ADM-3A
TEKCOM 3002 & OMNITECH 1200 COUPLERS IN STOCK
DECWRITER: LA36, LS120
CENTRONICS: 101A, 102A, 103
OLIVETTI: TC480 w/ PAPER TAPE & CASSETTE OPTIONS
HAZELTINE: THERMAL PRINTER
TELETYPE: 43 TELEPRINTER ASR/KSR 33·35·37
NOW AVAILABLE: TI 745 & DIABLO 1620

DEPENDABLE SERVICE for 11 YEARS to 5500 CUSTOMERS WORLDWIDE

CALL FOR OUR LATEST PRICES!
AMERICAN TERMINAL LEASING · 617-261-1100
P.O. BOX 68, KENMORE STATION, BOSTON, MASS. 02215

ED YOURDON'S MANAGING STRUCTURED EDP PROJECTS

Come hear Ed Yourdon talk about how to do it right!

Could you manage a project using the structured techniques? Do you know how the classical Project Life Cycle is affected by the technique's full-scale introduction into any EDP shop?

If your answer to these questions is "No," you should hear what Ed Yourdon has to say about the management of EDP projects.

Ed Yourdon has lectured in fifteen countries and written eight books on various aspects of structured techniques. His multi-million dollar company has provided consulting and training to over 5,000 companies. He is considered the leading authority on structured techniques in the country today.

Ed Yourdon's new two-day seminar will be held in Chicago on December 18-19 and in San Francisco on January 9-10 (future seminar locations to be announced). Enrollment is limited. Guarantee a space by calling us, toll-free, at 800-223-2452

YOURDON 1133 Avenue of the Americas, New York, N.Y. 10036

Executives Taking Stock Of Coming DP Situation

(Continued from Page 19)

ing for organizations to realize that for the last decade, these high-priced personnel have (in all too many cases) done nothing more than participate in upgrades and conversions in a never-ending attempt to keep pace with expanding hardware technology.

And according to studies released by the federal government, the demand for these personnel will skyrocket by 1985.

Where does that leave the corporate executive? How can he hedge against these inevitable inflationary trends?

One alternative relates to a new level of technology in the software area which can turn the need from expensive and time-consuming programmer training to the training of users at an intelligent terminal.

This will have two effects on an organization. First, the end user will no longer need to rely on DP personnel to program routine information requests. And second, the computing technologist will be freed to handle the organization's more complex information needs.

Obviously, this will require a completely diverse approach to most commercial software package offerings now on the market.

And that brings us to the executive's second alternative: acquiring external software.

Most Important

Decisions related to software acquisition will probably become the most important made by a corporate executive. In fact, it is paramount that the executive initiate a strategy to increase programmer productivity and provide a more effective price/performance ratio. This is highlighted by the fact that most organizations have already established a comprehensive corporate repository of data, whether in the form of a commercial data base package or some other approach.

And technology is demanding that the next moves be in areas relating to telecommunications, minicomputers and distributed processing. Hence, the critical path for DP in the next decade has already been established.

Both hardware manufacturers and independent software vendors realize this. In 1976, about 10% of DP expenditures were for software. Many industry analysts indicate an annual increase in the acquisition of software packages in the range of 28% each year for the next five years. And this revenue opportunity is prompting software producers to ensure that their products add value to computer hardware and communications resources to serve the needs of the end user.

Software solutions for the future must address the total information system problems of the entire organization, not just isolated areas. Data processors must be relieved of mundane, redundant technical support activities and permitted to become effective organizational probelm solvers.

And future software must also include those tools that make it easy for the corporate and user to satisfy information requests and solve the many daily problems organizations face.

Most important, however, executives will no longer have to deal with raw data — they will have meaningful information at their fingertips and can therefore make intelligent, informed command-level decisions critical to the organization's survival.

Information as Resource

Unfortunately, there is no single source for software comprehensive enough to satisfy all of an organization's information needs. And, quite probably, there never will be. But virtually every supplier of software products is busily engaged in defining and building tools to satisfy the next level of computing technology.

But more important than any level of technology is that organizations will begin treating information as a resource. The same level of management attention will go into controlling, protecting and using information in much the same way as any other perishable asset.

Many corporate executives with insight into tomorrow's computing problems (and opportunities) have already realized that sizable investments will be made in the area of software. And for that reason, they have directed their legal and financial staffs to investigate such areas as product deductibility and costs available for investment tax credits.

To date, most research has been inconclusive, since the federal government prefers to treat software investments as tangible property, while most states and local government agencies treat software as intangible.

But fortunately, organizations are outgrowing the mystique of the computer. They are moving from data processing to information processing. Actually, we have an information resource economy today. Industries are spending a total of $40 billion on computing each year. When we add telecommunications, the cost is more than $60 billion.

And if we add the costs of office personnel and equipment, the real users and support for information resources, the costs soars to more than $150 billion. But even that is small in comparison to the staggering $500 billion that is spent each year in this country on information resources in total.

The challenge, therefore, is to increase planning at all levels, to anticipate changes brought about by the future, to consider rethinking traditional organizational structures, to unify all operations dealing with information resources and to focus on the controls needed to manage the tremendous levels of information that will be required to run organizations and institutions in the future.

Elam is manager of communications support services at Cincom Systems, Inc., Cincinnati, Ohio.

Letters to the Editor

Article Missed Points Made in AUUA Keynote

In the coverage of my Americas Univac Users Association (AUUA) keynote address ["Lecht Predicts 10-Fold Price Performance Gain" (CW, Nov. 6)], several points were stripped of their qualifying commentary and could be subject to misinterpretation.

First, while I did say a 10-fold price/performance gain seemed to suggest the upper limit of large-scale uniprocessor technology expectations, the emphasis of my speech was on the fact that *an upper limit was being encountered* rather than on the 10-fold price/-performance gain. I said it was hard to imagine uniprocessor technology exceeding 10 Mips as currently packaged and with current materials, for example, with circuit heat packaging limitations.

Even if it were possible, long before we could expect to see such processors in the general-purpose marketplace, the cost of achieving such price/performance ratios would be too high.

Any uniprocessor operating even in the low-double digit Mips ranges could be expected to fulfill specialized scientific needs, and probably will not be seen in the commercial arena as a general-purpose commercial machine until Josephson Junction technology is perfected in the late 1980s.

Second, I did predict that the minicomputer business did not have a bright future, but the context in which I made it is extremely important to its meaning. The 1980s will see a time when people can obtain computer power in essentially any amount they want delivered by public or private utilities.

Since this continuum of power is anticipated to cover all ranges of today's systems and more, there will be no reason why we should continue to distinguish the minicomputer business as a unique product category. The classic boundaries of micro, mini midi and maxi mainframes are blurring so swiftly that modern systems like IBM's System 38 defy such categorizations.

With nearly the power of an IBM 370/158 on a single board, one would be hard pressed to label it a mini notwithstanding its mini range price. Thus, my remark was made to point out that yesterday's minicomputer business definitions which related price to word size, physical hardware size, memory size — even Kips — are rapidly fading.

When reporting on today's swiftly changing computer industry, news- [illegible]

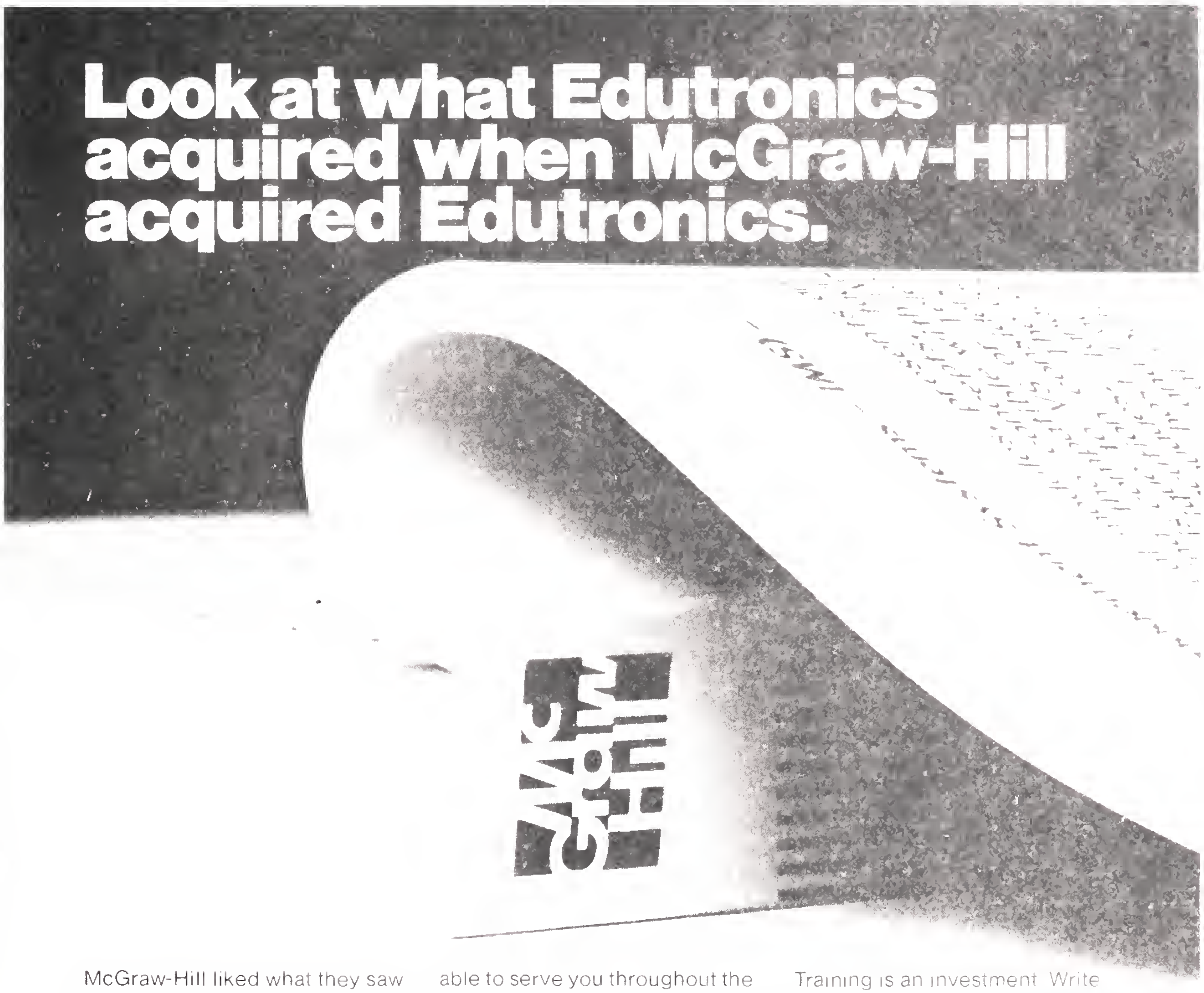
[illegible]

More on Transpositions

Robert B. Higgins' [illegible] [CW, Nov. 6], to my article, "Locating Transposition Errors" [CW, Oct. 9], certainly presented some worthwhile concepts and well thought out extensions to my original presentation.

I hadn't specified that a "divisible-by-nine" condition could be caused by other than a single adjacent transposition because I assumed — perhaps incorrectly — that it was [illegible]

[illegible]


Look at what Edutronics acquired when McGraw-Hill acquired Edutronics.
McGraw-Hill

McGraw-Hill liked what they saw in Edutronics. That's why they acquired us. But the fact is, now we have more to offer than we ever did before.

Edutronics/McGraw-Hill is still a leading audio-visual training systems company, but now we can give you the total resources of a Fortune 500 company which is dedicated to "Serving the Worldwide Need for Knowledge.

McGraw-Hill gives us, and you, access to some of the most knowledgeable EDP and management development authors in the world. We have additional capital to increase product development and customer service. And we're able to serve you throughout the world

Edutronics/McGraw-Hill is ready to help you now with training systems from entry level to leading edge for the user, EDP professional and advance theoretician. Whatever you need.

Of course, you can still take advantage of our unique modular training systems in data processing, management development and communications. And we continue to offer a dynamically growing catalog of multi-media training materials

Edutronics/McGraw-Hill. We're everything we used to be and a whole lot more.

Edutronics/McGraw-Hill

Training is an investment. Write or call us today and find out what investing with us can do for you

Edutronics/McGraw-Hill
55 Corporate Woods
9300 West 110th St
Overland Park, Kansas 66210
Toll Free **1-800-255-6324**

Please send additional information
Please have sales representative call

Name
Title
Company
Hardware
Address
City
State
Phone

SURVIVAL!!

CLEVELAND - The first edition of "Survival Procedures for the Computer Jungle" has been completed. The 15-page bound satire is a great gift idea for Computer Professionals and Users. Special Sales Reps 5-page edition is available at low-cost.

Send $7.50 to: THE COMPUTER MANUAL, P.O. Box 7045, Cleveland, OH 44128.

Letters to the Editor

Column on Banking Woes Rings Bell With Reader

I [illegible] to respond to "Banks [illegible] Facing Customers" [illegible] Kenniston Lord [CW, [illegible]].

[illegible] spect to the Baybanks [illegible] in six years of [illegible] is one of two [illegible] have had zero [illegible] we as a family [illegible] support with over-[illegible] the Sudbury [illegible] manager who was the [illegible] between us and the computer.

S[illegible] I have learned is [illegible] Arizona Bank for $[illegible] expenses I in-[illegible] bank's not [illegible] daughter [illegible] account there [illegible] College work-study assignment. At the termination of the assignment, my daughter and another student were to go to Mexico City and received a check for expenses from the college (Antioch).

The bank refused to accept it until it "cleared," which would not be until three days after they had to depart. We were called and sent a cashier's check from Newton-Waltham to the Arizona bank, which the bank again refused to accept.

I billed the bank for the cost of the phone calls, the exta expenses we incurred and the extra expenses my daughter incurred informing the bank that I had no intention of paying for the bank's protection when it had a clear and valid credit check on my daughter when she opened the account, and that data was in its computer records. I happened to have consulted for several West Coast banks and knew the internal policy of this bank.

And third, the worst foul-up involved American Express (would someone like to write a set of American Express horror stories?). I lost my card. The company gave me a new card number by phone (it took five weeks to get the real card).

I was in the midst of arranging a complex trip through its travel subsidiary. It refused to accept the new number.

Then when I used the new card for the first time entertaining some Swedish government guests at the lounge at Logan Airport in Boston, the new card was siezed because it was on the "missing list" and the lost one was OK. Very embarrassing. I didn't even get a "sorry."

Finally, *Computerworld*: I moved in June. New address sent in a month ahead. No CW. Four tries later I wrote to the president. I think the mail service found it difficult to find (no address) HARBOR HARBOR Washington, 98335. There are only about 40 harbors in 98335 and several hundred around Puget Sound.

William B. Helgeson
Gig Harbor, Wash.

Chamberlain's Affiliation

I enjoyed reading the recent articles by Robert Chamberlain on data base administration and a functional business definition for distributed processing [CW, Sept. 25, Oct. 23]. However, it should have been mentioned that Chamberlain is national manager of technical support for these areas and part of Coopers & Lybrand's National Management Consulting Services.

Walter J. Dick
Partner
Coopers & Lybrand
New York, N.Y.

Jobs Must Be Assigned

(Continued from Page 19)

plunges into such a morass needs his head examined. It is not an auditor's job to find out what *went* wrong, simply what *is* wrong. And what is wrong here is no one is accepting responsibility for the security question.

Job Descriptions

The real problem may be that management has not clearly delegated the task of keeping the computer site secure.

An auditor should not attack, even by implication, the performance of the DP department until it is made clear who has what responsibilities. This information should be in the *job descriptions*.

When that disgruntled auditor asked me at the November meeting what he should do about the management brush-off, I should have told him to check the job descriptions. If he found that management had failed to fully define responsibilities, he should have reported it.

The auditor's report should point out the danger of not clearly allocating the responsibility for physical security. Often the duties of a DP director appointed to run a site that has already been put into operation are especially vague.

Next year, if that problem has not yet been corrected, the auditor can use a different example; who has the responsibility for checking that a backup facility can really take over if the central system is down?

Try checking job descriptions. You may find that using this approach you can accomplish more.

© Copyright 1978 Alan Taylor. Reproduction for commercial purposes requires written permission. Limited numbers of copies for noncommercial purposes may be made provided they carry this copyright notice. The views expressed in this column do not necessarily reflect those of Computerworld.

Meet the World Leader in Data Concentrators

Meet MICOM's Micro800 Data Concentrator, the statistical multiplexor which ended the TDM era. The Micro800 allows up to 16 terminals to share one telephone line more efficiently and more economically than ever before, and provides the added benefit of automatic error correction. And since it is virtually self-configuring, the Micro800 also offers *do-it-yourself installation* — no straps, jumpers, plug-boards or 'kluge' headers to mess with.

So if you have a time-share network and you think you can only afford error-controlled multiplexing to cities with more than 8 or 16 dial access ports, think again ... and try our Autobaud feature, you'll like it.

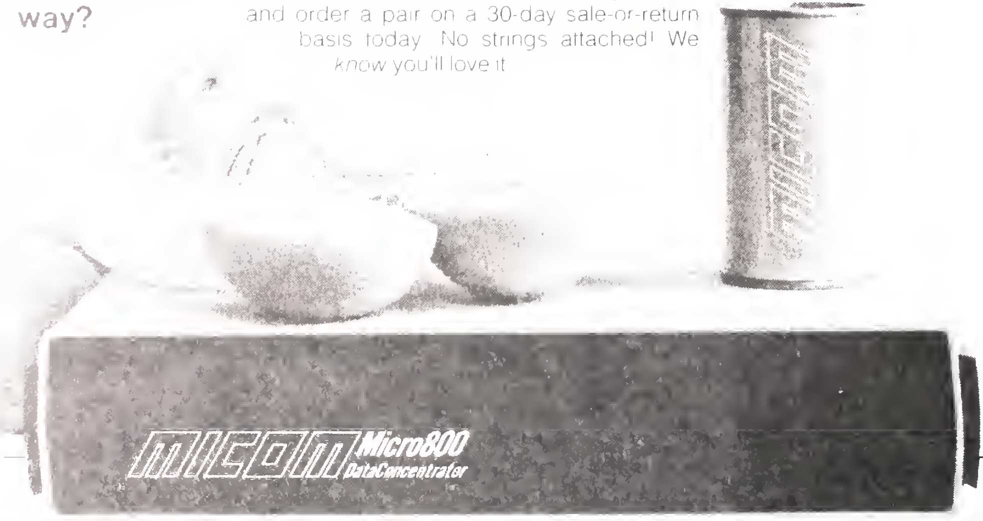
Or if you have a large private data communications network, and you can't afford to provide direct network access in your smaller locations, the Micro800 can provide economical error-controlled multiplexing into your network concentrators for as few as two terminals ... and software demultiplexing in your network nodes may be awfully attractive.

In particular, if you have a minicomputer system with several terminals in one remote site, you are probably paying a fortune in communications costs, operating the terminals slower than you would like, and learning to live with the occasional phone line 'glitch' which drives your CRT's crazy. Why not talk with some of our Micro800 customers, supporting four 2400 bps CRT's on a single 2400 bps line, glitch-less! ... and take advantage of our Hewlett-Packard, TermiNet® and DECwriter® options.

The Micro800 requires absolutely no changes to the hardware and software you have installed today. Hundreds of Micro800's are already in service, and prices start as low as $1150 for a 2-channel unit. So why not call and order a pair on a 30-day sale-or-return basis today. No strings attached! We *know* you'll love it.

Still squeezing data through the old-fashioned way?

Concentrate. It's cheaper!



MICOM MicroComputers for DataCommunications

MICOM SYSTEMS, INC. • 9551 Irondale Avenue • Chatsworth, California 91311 • Telephone 213/882-6890 • TWX 910/494-4910

Supports 1,700 Stores

Package Tunes Retailer's DP Operation

DALLAS — Planning, scheduling and controlling the efficient use of resources is an understandably challenging task at the corporate computer center of Zale Corp. The nationwide retailer in such diverse fields as drugs, shoes, jewelry and sporting goods has assigned to its data center the responsibility for payroll, inventory control, automated warehousing, on-line credit and automated inventory adjustment for some 1,700 units nationwide — in addition to the usual business accounting tasks.

The center receives input from subcenters in New York and San Antonio, Texas, as well as from point-of-sale terminals in the stores. With an IBM System 7, the center queries stores nationwide each evening to adjust inventory automatically on the basis of the day's transactions.

But "the center's main systems are an IBM 370/158 and a 370/145, and they are working four shifts, six days a week, staffed with 140 people," according to John Granger, systems resource analyst. "It is a continuing responsibility to devise more efficient and economical ways of using these resources of people, machines and time.

"There was a feeling here that the growth of capacity was getting out of control, that we were using up our computer resources and the only way out seemed to be a costly 'more,' which was not economically acceptable. We looked for a better way."

That "better way" was found with the installation of a Data Center Scheduling System from Value Computing, Inc. which, Granger said, "gives us tight control of our CPU devices, enables us to put a clamp on the upward spiral of costs and move jobs in and out faster than we could before."

Input to the scheduling system is the logged accounting data from the operating systems. This data is captured automatically and saved on these files.

The system builds job and step profiles from this data and employs techniques to purify the production statistics from testing, Abends and reruns. Exponential smoothing techniques are used to keep wide deviation of runtimes, for example, from distorting the data.

Schedules are produced on week-ends for the following five work days, Granger reported.

With VCI's Valu-Gen system, report sheets are produced which give a breakdown for each of the five days according to the person who is to run the individual jobs. These individuals make whatever changes are necessary and, on a day-by-day basis, return the

(Continued on Page 24)

'Liber 8' Manages Distribution Of Technical Manuals, Documents

GREAT NECK, N.Y. — Developed to help IBM-oriented programming staffs keep track of their technical libraries, the Liber 8 package from Labyrinth Systems Ltd. is said to automate the recordkeeping and cross-referencing needed to eliminate unnecessary duplication of manuals and newsletters while making sure that needed literature gets to where it is needed.

Frequently the problem with manuals is not their scarcity but their overabundance — especially when bulk shipments of updates are received at a central site under a subscription service — with no clear knowledge of who needs them, where and why, a Labyrinth spokesman said.

The package provides the technical librarian with the facilities to build a data base, identifying exactly who has what manuals and which are on subscription service. From this base, the librarian can extract a list, and mailing labels if desired, for the appropriate recipients as soon as a shipment of manuals or newsletters is received.

The system is also capable of producing lists showing where various manuals are currently being distributed. This facility could be very useful for those times when disk drives, for example, are being installed and the documentation for the old peripherals has to be replaced as well, the spokesman suggested.

The initial creation of the data base is probably the toughest part of using Liber 8, he said, noting that most installations have been "rather casual" about where incoming manuals go and how many are actually needed or being used.

Once that is done, the file maintenance is built into the system. The librarian simply indicates that a given manual has been received; the software updates the intended recipients' records and produces mailing labels with as complete an address as is in the data base for each recipient.

The package functions under DOS/VS and will "run like crazy" if given a 132K-byte virtual partition, though it can be used in as little as 102K bytes, according to Labyrinth.

The software costs $1,500 and can be ordered from 17 Barstow Road, Great Neck, N.Y. 11022.

'MSI' Protects Shared DASD Files

NAPLES, Fla. — The Multiple Systems Integrity (MSI) package from Allen Services Corp. is said to guarantee file integrity across IBM systems accessing shared direct access storage devices (DASD) while operating under any of IBM's OS or OS/VS environments.

MSI is not a security package, a spokesman emphasized. Rather, it solves data integrity problems caused by simultaneous access of the same data by more than one system, and it improves overall system performance by allowing more flexible scheduling and by eliminating many prolonged DASD reserves, he said.

The hazards of simultaneous updating by operating systems in a single-system environment have been recognized. But internally enqueuing the name of each active data set under the SSDSN major name — the usual protection mechanism — does not span intersystem activity, and it is very easy for users in different systems to concurrently modify the same data set, the spokesman asserted.

'Unified System'

MSI relieves users, programmers and operations personnel of trying to cope with the problem. Instead, it returns the means of handling the problem to the operating system by propagating internal control information from each system to all others that share common DASD.

This "unified-system" approach to integrity can be utilized with "any number of associated systems" and applied to all aspects of the user's operations "including, of course, both batch and [Time Sharing Option] TSO," he continued.

MSI avoids the locking out, or reserving, of an entire DASD volume, which is normally used to protect one data set while it is being updated, by allowing installation-specified classes of RESERVEs to be internally and transparently converted to MSI-type ENQUEUES known to all associated systems.

MSI Basic, which does not include the RESERVE activity alternative, is available for $10,000 or $750/mo for the first CPU and half those costs again for each additional system.

The same pattern applies for the full MSI package. Thus, although its base cost is $20,000 or $1,500/mo, the effective cost for a two-system installation is $30,000 or $2,250/mo, the vendor said from 2902 14th St. N., Naples, Fla. 33940.

ATTENTION!! SHARED DASD INSTALLATIONS

DUQUESNE SYSTEMS INC
Established 1970
1511 Park Building
355 Fifth Avenue
Pittsburgh, Pa. 15222
(412) 281-9055

- If you have SHARED DASD, your data can be lost or damaged due to simultaneous access by sharing systems.
- If you are using device RESERVE to prevent simultaneous access, you have significant performance degradation.

YOU NEED
SHARED DATA SET INTEGRITY—SDSI

☐ Please send me more information on SDSI
☐ Please have a representative call me
IBM Operating System
MVS ☐ SVS ☐ VS1 ☐ MVT ☐ MFT ☐
Name
Title
Company
Phone
Address
City State Zip

CP-77 Extends Vortex II, Boosts Univac's V77 Mini

IRVINE, Calif -- A general-purpose multiterminal time-sharing system called CP-77 has been announced by Univac for use with its V77 series minicomputers. The software is said to be a compatible extension of the Vortex II operating system.

CP-77 operates with or without Vtam communication access facilities and provides a basis for operation of small to midsize multiterminal systems, according to a Univac spokesman.

The time-sharing system supports the entering and editing of program source code, the submission of job-streams to the background job queue and the execution and debugging of tasks directly from the terminal, the spokesman noted. In addition, CP-77 serves as a development system for programs designed to run under Univac s Pronto transaction processor.

Other facilities available to the CP-77 user include support for a "virtual printer ; program output and alphanumeric file contents can be directed by the terminal user to an output spooling device.

Developed by the Laboratory for Advanced Methods in Biological Data Acquisition at Brown University, CP-77 is said to maintain a unique terminal-oriented file system and to provide each user with four logical units which can be assigned to system peripherals.

The system provides the terminal user with the means to perform simple calculations as well as the ability to send simple messages to other user terminals or to the system operator's console, the spokesman continued.

CP-77 maintains user identifications and passwords required for terminal access but also provides terminal users with the ability to access information about system status and the condition of background input queues, he said.

Distributed on 7- or 9-track magnetic tape, the time-sharing software will run on any Vortex II-configured V77 (or V70 with extended instruction set), 96K bytes of main memory, adequate disk space, a tape unit and teletypewriter-compatible terminals.

CP-77 costs $1,500, according to Univac s Minicomputer Operations based here in Irvine, Calif.

Scheduler Aids Retail Chain

(Continued from Page 23)

sheets to the scheduler, which then produces a complete detailed schedule for that night. If a job is not on the schedule, it is not run.

An "actual vs. schedule" report is produced to close the gap between what was planned and what was actually run. The system also enables people to see from the schedule sheets the jobs for which they are responsible. A job profile for the shift eliminates uncertainties and enables the person to focus on the work that lies ahead.

"Job profiles began changing after we used the scheduling system for a while," Granger concluded. "People found that, with this kind of knowledge, better utilization of capacity could be gained.

"As a result, jobs are now getting in and out faster. And we have the kind of long-range foresight that is critical for future resources planning."

'Bomp' Ready for PDP-11

SKOKIE, Ill. — Manufacturers are now exploding data up to 40 levels on Digital Equipment Corp. PDP-11s through the use of a bill-of-materials processor (Bomp), according to its vendor, J. Baker & Associates, Inc.

The package is a series of 40 Dibol programs that provide output reports ranging from item lists and a single-level bill of materials to an assembly cost buildup report and any of eight types of master file lists, a spokesman said.

Full stock status reports with reorder points and economical order quantities, manufacturing and assembly shortage lists and lists of purchase parts shortages with automatic generation of purchase orders, as well as a top-level production schedule are also output, he said.

Reporting can be controlled on a detail, summary or exception basis. The full product cost reporting can be at any level such as component or operation, subassembly or manufacturing department. Variance analysis is available for current pricing, the spokesman added.

The system can handle multiple companies or locations. There is a "completely unrestricted" bill-of-materials definition, he added.

Running under either RSTS/E or CSC/300 on a CPU with as little as 48K main memory, Baker's Bomp costs $8,800, Baker noted from 5135 W. Golf Road, Skokie, Ill. 60076.

Register now for an event that will shape your perspective for the next decade:

FUTURE SYSTEMS FORUM

Computer Hardware, Software, Architecture and Applications Analyzed and Forecasted for the '80's!

On January 24th, 25th and 26th, 1979, an extraordinary group of computer industry professionals will meet at the Barbizon Plaza Hotel Executive Conference Theatre to exchange ideas — with you — on the urgent computer/communications/service systems decisions facing us all.

The FUTURE SYSTEMS FORUM will present all views — user, vendor, consultant — to help you, the key EDP executive in business or government, plan ahead. By assembling a prestigious panel of leading systems innovators, the FORUM combines technology forecasting with applications research for a unique look into the future.

How will *you* handle the uncertainties of the 1980's? Product improvements are often made faster than the original products can be delivered...leaving manufacturers, users and investors to re-evaluate their strategies and plans. The trends that will affect these decisions in the 1980's are clear *now* to only a few individuals — farsighted analysts, who can accurately forecast probable changes in technology, products and market needs.

By attending the FUTURE SYSTEMS FORUM, you will hear and speak with these professionals, as they put the issues into sharp, meaningful focus. First, you'll prepare for the FORUM by participating in several intensive studies, including a system-requirements analysis and technological-forecast survey. Then you'll listen to the speakers, later questioning them on the specific topics that affect *your* individual situation.

The future of your business could very well be guided by the information you receive—and the viewpoints exchanged — at this timely meeting.

Anyone who *must* know where the computer, communications and service industries are headed during 1979 and beyond *must* attend. Make your advanced reservation, today.

This Elite Panel of Experts Will Guide You Through Your Tour of the 1980's

Charles P. Lecht
President, Advanced Computer Techniques Corporation
Keynote Speaker. "Evolving Products and Unfolding Marketplaces—1979 and Beyond." Retrofitting future systems to user needs and organizational requirements: optimization of the user, not the machine.

Robert T. Fertig
Vice President, Technology Analysis Group, Advanced Computer Techniques Corporation
"Forecast of Systems Architectures, Technology and Performance—1979 and Beyond." Likely systems price/performance improvements and functional advancements; impact of technology on future systems architecture and design.

Patrick J. McGovern
Chairman, International Data Group, and Publisher, Computerworld, Computer Business News
"User Expectations for Systems in the 1980's." Drawing on the attendee survey, this study will forecast user expectations in terms of product performance, software, communications and support.

John Bock
Vice President, Systems Development, Itel Corp. Data Products Group
"Plug-Compatible Systems: Alternatives in the 1980's." Can the plug-compatible survive and grow in the '80's? What new PCM strategies and products can be expected?

Victor D. Poor
Senior Vice President, Research and Development, Datapoint Corporation
"Distributed Systems Architecture and Processors." Distributed functions, control, processing, databases: what are the present and future economic trade-offs?

Dr. J. Egil Juliussen
Senior Member, Technical Staff, Texas Instruments Corporation Engineering Staff
"Semi-Conductor Technology: Driving Force for Computer Systems." Can current computer architecture/designs effectively utilize 64K storage chips, bubbles, CCDs, fiber optic cables, etc.?

Dr. Eugene I. Lowenthal
Vice President, Advanced Product Planning, MRI Systems Corporation
"Database-Centered Architecture and Processors." The back-end file processor's impact on the user and vendor; strengths/weaknesses of the database-processor approach.

Asa W. Lanum
Director, Product Software Development, Amdahl Corporation
"User Opportunities to Improve Software Investment Pay-Off." Can new software be combined with old to produce more effective end-user operation? How does hardware enhance or stifle the potential?

C. Oakley Mertz,
Vice President, Research, International Data Corporation
"The User Customer Base and Systems Migration Dynamics; Impact of Distributed Processing." IDC's migration study—how fast are users moving to newer systems, networks (SNA/SDLC) and distributed processing? What is the likely impact on computer usage in the 1980's?

James E. Thornton
President, Network Systems Corporation
"New Alternatives in Systems Architecture." Will conversion/migration between non-compatible systems be easier by 1982/83? More or less costly? And what innovative architecture choices are open to users now?

James McGuire
President, Computer Division, National CSS
"Computer Services, User HardWare Hybrid Systems." Why are the service companies now supplying their own hardware? What's next?

Dr. James W. Jewett
Vanderbilt University, and President, Telco Research Group
"Communications Systems—Optimizing 1980 Alternatives." How can users select from new carrier offerings in the packet and satellite areas? What compromises and trade-offs are needed with existing communication network investment?

Additional speakers to be announced.

Richard L. Nolan,
Chairman, Nolan, Norton & Company
"Planning to Manage the New Systems Technology in the 1980's." Managing and adapting to fast-paced changes in technology and marketplaces; cost-benefits analysis and cost control.

Immediately Available
For Lease

3333-1
3330-1

Call: Bill Castellano
(312) 420-8181

NF COMPUTER
SALES & LEASING CORP

'Arsap' Checks PDP-11s

HYATTSVILLE, Md. — Installations running Digital Equipment Corp. PDP-11s under RSX-11M can monitor system usage, measure system performance and bill for resources used with Arsap, the RSX-11M system accounting and chargeback system from Gejac, Inc., according to a spokesman.

Arsap logs statistics that reflect the resources consumed by individual users of the system. Data collected includes terminal connect time, number of log-ons and log-offs, disk storage utilization, number of I/O requests, CPU execution time and memory demand, the spokesman said.

The statistics are periodically presented to the user in a series of reports.

These reports include both a summary of resources used and a detailed listing of resources consumed by each user, a terminal connect time profile in histogram format and detailed reports at the user's terminals at the end of each session showing the resources used.

Chargeback reports produced by Arsap include a financial summary which shows the accumulated charges and documents the billing rates and algorithm. In addition, numbered user invoices, sorted by user name, show both use and cost information, the spokesman said.

The package costs $1,995 and can be ordered from Gejac at 3322 Stanford St., Hyattsville, Md. 20783.

'SAS,' 'Tell-A-Graf' Tie Adds Graphics to Analysis

WASHINGTON, D.C. — By interfacing two commercially available packages, technicians at Applied Urbanetics, Inc. (AUI) have made camera-ready graphics available as a by-product of statistical analysis operations on IBM 360, 370 and compatible systems.

A spokesman at AUI explained that although the users there liked the facilities of the Statistical Analysis System (SAS) from the SAS Institute — especially its data base management capabilities — they also wanted high quality graphics to include in their litigation and policy research projects.

To meet that need, the authors of SAS developed an interface between their package and Tell-A-Graf, available from Issco.

Tell-A-Graf is a graphics software system that allows users to make high-quality charts and other graphs on any computer graphics hardware using English language commands, the AUI spokesman explained. Without SAS, however, Tell-A-Graf was limited because it had no inherent data management or statistics capabilities, he contended.

The linkage now available from AUI allows analysts to perform statistical analyses of their data and then produce charts to highlight their conclusions.

The SAS/Tell-A-Graf combination has been used to drive large drum plotters such as those produced by California Computer Products Inc. and Zeta, Inc., flatbed plotters produced by Hewlett Packard Co. and Tektronix, Inc. and CRT units such as those from Chromatics to have soft-copy color displays, he said.

The combination software (SAS, Tell-A-Graf and linkage) is available for $23,000 from AUI, 1701 K St. N.W., Washington, D.C. 20006.

'Sysmon' Update Aids MVS Usage

INDIANAPOLIS — Half a dozen enhancements have been built into Version 2 of Sysmon IV, making the update an even more powerful on-line systems monitor for IBM OS/MVS shops than the original package, according to the vendor, Performance Systems.

Sysmon IV is said to support uniprocessor, multiprocessor and attached processor configurations without any system modification through the use of simplistic control parameters for the performance displays. The package is RMF compatible and supports both Time Sharing Option (TSO) operations and the system operator's console, a spokesman claimed.

The displays include such things as processor and channel utilization percents, demand paging, page faults, total system paging and swapping, unreferenced page interval counts, length of queues for I/O devices, and performance group and domain service levels and transaction rates, he continued.

Version 2 includes exception reporting on direct access and tape devices. These pinpoint enqueue bottlenecks, reserve lockouts, mounts pending and device "drop ready."

An address space summary for TSO, batch, mounted and started tasks is a feature of Version 2, as is a report that shows specific system loading reportable to TSO, IMS, CICS, on-line and a range of other applications selected by the user as critical to his operation.

A display of start/stop times to allow multiple CPU coordination also shows selected time interval reporting, he said.

Version 2 costs $289/quarter year per CPU, with a 50% surcharge for each additional CPU at the same site. Performance Systems can be reached through P.O. Box 44143, Indianapolis, Ind. 46204.

Host Organization and Registration Information

IITI The International Information Technology Institute, the program manager, is a non-profit organization chartered to provide professional development and educational support to information systems executives. It draws on the skills and experience of highly qualified consultants, users, vendors, and university researchers to address key issues in information systems planning, applications, computing economics and technology assessment. IITI programs emphasize practical presentations by skilled speakers, as well as audience involvement in pre-conference studies and issue definition.

ACT Advanced Computer Techniques Corporation is an international firm that provides management, product planning, and product implementation services in a wide variety of areas within the information systems industry. These services include: facilities management, feasibility studies, problem analyses, systems analysis, office automation, service bureau operations; programming project management and systems application software development.

The future of your business could very well be guided by the information you receive — and the viewpoints exchanged — at this timely meeting.

FUTURE SYSTEMS FORUM

The Barbizon Plaza Hotel
106 Central Park South
New York City

January 24, 25 and 26, 1979

- User technology alternatives and trends in price performance of hardware, software and communications.
- Economic options open to users in the face of attractive new products — but previously purchased hardware and committed applications.
- Systems choices in a mixed vendor environment, as software increasingly differentiates look-alike hardware.
- Distributed processing and distributed database potential and problems.
- Management control and systems planning to optimize hardware/software investments.
- Impact of IBM's 8100 on distributed processing applications and DDP/minicomputer vendors.
- User acceptance of AT&T's ACS/IBMs SNA.
- New technology/applications impact of IBM's System 38.
- Potential for low and mid-priced plug-compatible processors (NCSS, Nanodata, ITEL etc.)
- Software in firmware/microcode.

Plan now to take advantage of this special opportunity to hear, learn from and share your experiences with leading analysts and forecasters.

Cost for the three-day FORUM is $600, which includes FORUM materials, advanced survey participation, reproduction of speakers' visual aids, lunches, refreshments, cocktails — but not hotel accommodations. Cancellations may be made no later than January 15, 1979; substitutions, without charge. Late cancellations are subject to a $75 charge.

The FORUM will be held in the Executive Conference Theatre of the Barbizon Plaza Hotel, which is considered to be one of the best equipped conference rooms in New York City. A block of rooms has been set aside at attractive rates for FORUM attendees. Please check-mark on the registration form below whether or not you want to receive a postage-paid reservation card... or you can *call* the Babizon Hotel directly — at 212-247-7000 — and mention the FORUM.

Return the Registration Form below, or call this special number: 617-964-4552.

So that we can provide a more personalized service to attendees, a limited number of spaces are available. Make your reservation today.

IITI International Information Technology Institute
60 Austin Street
P.O. Box 265
Newtonville, MA 02160

Future Systems Forum Registration Form

Please reserve ______ space(s) @ $600 per attendee at the three-day FUTURE SYSTEMS FORUM. I am including the names of all those (besides myself) who will attend on a separate piece of paper. I understand that the fee includes FORUM materials and reproductions of speakers' visual aids, lunches, refreshments, cocktails — *but not hotel accommodations.* I further understand that cancellations must be made before January 15, 1979, without being subject to a $75 charge.

cw3

☐ Payment enclosed. (Made payable to "IITI.") ☐ Please bill company

Total amount ______

☐ Check here to receive Reservation Card from Barbizon Hotel.

Name ______ (Please print or type)

Title ______

Company ______

Street ______

CITY ______ State ______ ZIP ______

Just fill in above, detach this form and mail it with your payment to IITI at the address above. You will receive registration and accommodations information well in advance of the FORUM

ATTENTION BURROUGHS USERS

Zeta Corporation announces 160cps KSR terminals. Plug compatible with Burroughs Data Communications Systems.

- Immediate Delivery
- 42 Programable Functions
- Increased speed and throughput
- Nationwide Service
- Rental or Purchase plans tailored to suit your requirements.

ZETA CORPORATION
1 West Deer Park
Gaithersburg, Md. 20760
(301) 840-1070
KB
DATA COMMUNICATIONS EQUIPMENT

Name________ Title________
Company________
Address________ Telephone________

DON'T BID WITHOUT AN ACE IN THE HOLE.

Get PIOS/MPS.

Our *Master Production Scheduling System* means you know you can deliver what you promise. And that's what a manufacturer is remembered for: meeting the bid. PIOS/MPS gives you an edge

Use it to simulate workload size and mix. Evaluate upcoming adjustments. Apply it to finished product or an important status point in production. The bill of labor adapts to what you need to know. Your resources and time-factors are all at your fingertips.

Over 15 years and 20 successful systems, we can give you the answers fast. PIOS/MPS will

- Work with our PIOS Material Requirements Planning module. Or with yours. Or stand alone.
- Operate independent of data base.
- Run on Honeywell, Data General or IBM hardware.
- Adapt to batch, on-line or distributed data processing mode.

We work on a solution-oriented basis, and we're with you until your PIOS System is working the way you want. And you have the upper hand. There's more. Just call for our free brochure or more information:

TOLL FREE: 1-800-327-0173 – X 901.
(In Florida, call toll free: 800-432-0151 – X 901.)

RATH & STRONG, INC.
SOFTWARE DIVISION
Boston • Chicago • Denver • Los Angeles

Bollinger Claims Blasted As Nearly Irresponsible

By Stephen L. Robinson
Special to CW

Data Base Corner

The comments by Norman Bollinger ["Shop Can Save by Writing Its Own Data Base Package (CW, Sept. 25)] border on the irresponsible. Bollinger not only advocates building one's own data base package, he states it is cheaper than purchasing a vendor's product, implies the whole process is quite simple and claims the result will be "superior to the vendor's."

Presumably the acquisition of Bollinger's $35 guide makes the process still simpler and the result even more superior.

Let's address the issues one at a time; first, consider the matter of cost. Bollinger has badly misinterpreted a true statement about commercially produced software — that 15% of a package's cost goes for development and maintenance, 85% for marketing and support.

This is true, but *not* for the first copy sold, nor the 10th, nor the 20th. Rather it is true after the package has "turned the corner" financially. That is, after sales of $1 million, a development cost of $200,000 would be balanced by marketing costs of $800,000.

Development Cost

The cost of developing a *good* data base package is not "far less than $20,000" as Bollinger stated, but considerably closer to $500,000. A stripped-down system with very little capability will likely require at least two man-years of effort, not to mention the requisite computer time.

Such a stripped-down system would probably not have such properties as multithreading, extensive security provisions, generalized interfaces to facilitate access by query languages and report writers or data base administration tools. It would also probably lack reliable backup and recovery procedures which synchronize recovery with multiple batch and on-line users.

The list could be extended, but I believe the point has been made.

What Does One Get?

This leads us to the second area of contention; namely, what does one get for "far less than $20,000"?

It should be noted that $20,000 probably pays for about four months of a good system programmer's time (assume a good person earns a salary of $30,000, benefits, overhead and so forth add up to an equivalent sum). This does not include any computer time, although perhaps by following Bollinger's guide, we can write error-free code the first time through.

It is suggested we should get program-independent data. To me this implies some form of subschema or user view facility.

Bollinger proposes to do this by loading the code and the data definitions at runtime. Fine, but the code to handle true user views is quite tricky, and the necessary mechanisms to prevent resource interlock are even more difficult.

If all that is being proposed is a simple mask for records, it can be done without too much trouble, but the end product is hardly anyting to write home about.

Next we have Bollinger's second component, I/O. No argument here, except if one wants to consider the relative inefficiency of Cobol I/O. However, since the whole package is to be written in Cobol, it would seem that efficiency is clearly not a concern here.

Funniest of All

Fnally we come to the most hilarious of observations, file and record relationships: "This is a logical problem which, if well-defined, will be easy to handle."

I don't care whether Bollinger elects

(Continued on Page 30)

Freight Bill-Paying Service Adds Support in Midwest

LEXINGTON, Mass. — The Freight Audit Computerized Traffic Statistics (Facts) service, already available to shippers through Traffic Data Systems, Inc. (TDS) here and in Pasadena, Calif., is now being offered by TDS-Midwest, Inc. in Oak Brook, Ill. as well, according to a TDS spokesman.

Under Facts, TDS can either pay a shippper's bills or monitor the bills as they are paid by the shipper's bank. In either case, the bills are sent to the TDS office, where they are put through a detailed manual audit against the carrier's filed tariffs, the spokesman said.

This audit may pinpoint over- or undercharges, duplicate billings or other errors that a completely automated review could overlook, he said. After the audit, the bills are keyed into TDS' mainframe — a Honeywell, Inc. 60/62 — for processing.

The processing produces edit lists and generates management reports in addition to checks to the carriers if the client has contracted for the payment option.

The reports provide analyses of the company's overall shipping patterns, the spokesman noted.

Facts reports trends on such key items as vendor, customer, carrier, product line, transportation mode and frequency of movement.

The manual audits and the data entry are done in the local TDS offices, after which the magnetic tapes are shipped here for processing. This provides both personal contact and the economies of centralized DP, the spokesman said.

Basic Facts service — bill auditing, five basic reports and payments if desired — costs approximatley 60 cent/-bill submitted, and the company suggests that shippers with 500 to 1,000 bills a month are large enough to benefit from the service.

The corporation is headquartered at 1050 Waltham St., Lexington, Mass. 02173.

MAESTRO.™ FOR THE SWEETEST SOUND YOUR PROGRAMMERS HAVE EVER HEARD.

Itel introduces a revolutionary advance in interactive program development. With Maestro,™ the first distributed programming solution.

Combining all the advantages of on-line programming with state-of-the-art distributed processing technology, Itel's Maestro takes program development off-line and puts it where it belongs—in the programming department. So your CPU has more time to concentrate on production. And programmers have more time to concentrate on creative problem solving. Because Maestro handles repetitive, time-consuming programming chores.

Itel's Maestro also provides programmers with advanced techniques, such as permanent audit trails, that are unavailable from existing interactive systems.

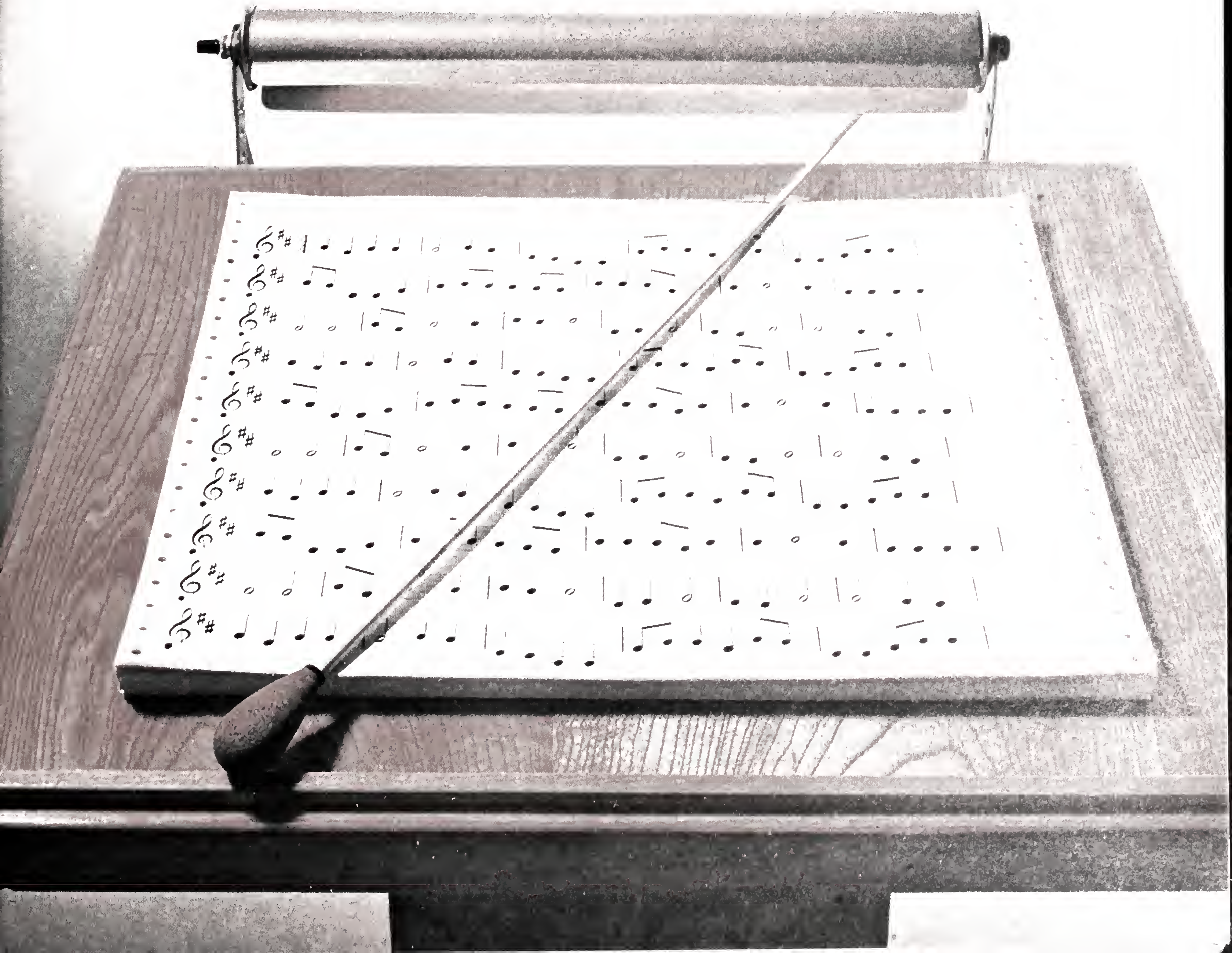
Maestro supports software development in all current computer languages and functions independently from your CPU and operating system.

So Maestro delivers the best of both—off-line development and on-line implementation. To save you time and money, with the most advanced solution to program development and maintenance available.

For more information about distributed programming with Maestro, call Itel Corporation, Computer Products Division at 800-227-8425. Within California: (415) 494-3338

ITEL

DISTRIBUTED PROGRAMMING FROM ITEL.



Word processing with ForeWord,™ the is faster, more accurate system for professionals.

Move up to the simple-to-use tool for letter perfect work.

ForeWord is our powerful shared-logic word processing system for transcription of dictated correspondence, for editing and revision of long or short documents and for direct composition by working writers. All functions may be handled at the same station, or simultaneously at multiple stations.

Makes old style equipment totally obsolete.

ForeWord offers capabilities older systems can't match . . . Powerful editing through simple keystroke commands. Vastly expanded storage with all material instantly accessible. Significant cost savings through outstanding operator productivity. And service and support nationwide.

Sets the standard for shared logic systems.

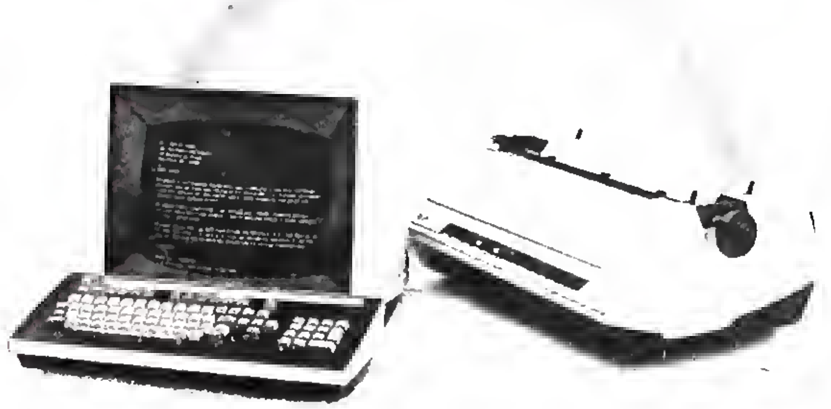
Each ForeWord system is expandable at your convenience from as few stations as you need today to as many as 24 keyboard stations and 16 printers. A selection of disk cartridges lets you store from 500 to more than 50,000 pages of text. Stations may be installed in individual offices, or in your word processing center, or in both in any combination. And any station may be located up to 4,000 feet from the ForeWord processor, allowing a single system to service even the largest facilities.

Word processing is just the beginning.

With a ForeWord system speeding and simplifying your written work, you enter a new world of electronic information handling. Because with Four-Phase you can add source data entry, central computer inquiry and standalone data processing to the same system whenever you're ready. And all functions are available at every station with a touch of a key. The result is a unified computer network to meet your growing needs. All field proven and available now.

Comparing systems? Use our handy selection guide.

Because we know how confusing evaluating word processing equipment can be, we've prepared a selection guide to make your comparison simpler. To receive your copy along with complete information on ForeWord, just return the coupon.



Yes, I would like to learn more about ForeWord, the word processing system for professionals.

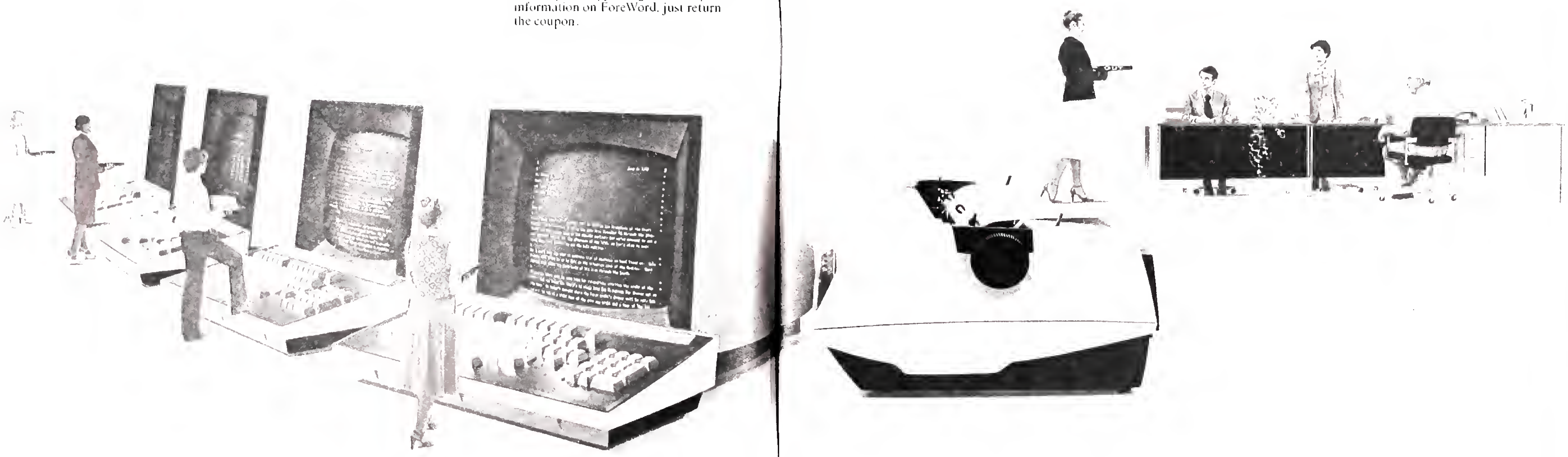
☐ Send your selection guide.
☐ Arrange a ForeWord demonstration for me.

Present word processing equipment
Name ________________ Title ________
Company ________________
Address ________________
Telephone ________________ Ext. ________
City ____________ State ________ Zip ________

Four-Phase Systems, Inc., MS 421B8-F
10700 N. De Anza Blvd., Cupertino, CA 95014, (408) 255-0900.

CW-11/27

Four-Phase Systems, Inc.
Word Processing for Professionals



TM Trademark of Four-Phase Systems, Inc.

Structured Forum Hits Road

NEW YORK — The Structured Forum, a one-day review of various structured design and development methodologies, begins an 18-city tour with sessions this week in New York, Boston, Toronto and Detroit.

The New York meeting is tomorrow and stops in the other cities will follow as the week progresses, according to a spokesman for co-sponsors Structured Methods, Inc. and Edutronics/McGraw-Hill.

Subjects to be covered at each stop will include the Warnier/Orr methodology for the construction of logical programs, the Jackson design methodology, Constantine/Myers/Yourdon concepts, basics of data base design and human resource development in a DP environment, the spokesman added.

Chicago, Minneapolis, Seattle, San Francisco and Los Angeles are on the schedule for Dec. 4-8, while Denver, Kansas City, Dallas, Houston and St. Louis make up the itinerary for the week after that.

Early in the week before Christmas, the forum will be presented in Atlanta; Columbus, Ohio, Washington, D.C., and Philadelphia.

Individual registration is $175, but group discounts are available. All attendees will receive a $100 credit toward services from Structured Methods or Edutronics or books from McGraw-Hill.

More information is available from Structured Methods, 133 E. 58th St., New York, N.Y. 10022.

'BDRaid' Backs IMS, CICS; Includes Three Programs

NEW YORK — BDRaid, an IMS utility package from BDR, Inc., consists of three basic programs: the Data Base Access Facility (DBAF), a Logical/Compare Utility (LCP) and an unload-reload utility (DBRfresh).

DBAF is described as a generalized utility which provides access to IBM's IMS and CICS data bases and segments. Through a command language, data base segments can be printed and modified as required, a spokesman said.

The use of external tables to drive DBAF eliminates the need for changes in the program each time a different structure is encountered or when changes are made to the data base design, he explained.

LCP is a Cobol program with an internal sort that sequences and compares data sets created by DBAF. By processing DBAF against data bases before and after executing an updating program, two data sets are created containing "before" and "after" images of the data base.

BDRfresh is an on-line IMS program that will, under control of an IMS message, refresh and save any or all data bases being used in an on-line test environment. Once BDRfresh is invoked, it will perform the desired task and send the operator a "ready" message when the refresh or save operation has been completed, the spokesman added.

The package is available now for $18,500 from BDR at 17 E. 45th St., New York, N.Y. 10017

Bollinger Claims Blasted as Wrong

(Continued from Page 26)

to employ pointers embedded in records or pointers in external tables, there is nothing simple about creating such facilities.

Bollinger has omitted from his list of components the utilities and amenities which typically accompany commercially available data base packages — for instance, high-speed loaders, high-volume update facilities, dump routines and statistic routines. He also omitted the need to maintain the software, enhance it and adapt it to new operating systems and I/O gear.

If He Leaves?

We might also mention the problem of what an organization does when the single person who understands the system (for $20,000 this is presumably a one-man effort) decides to leave or gets hit by a truck.

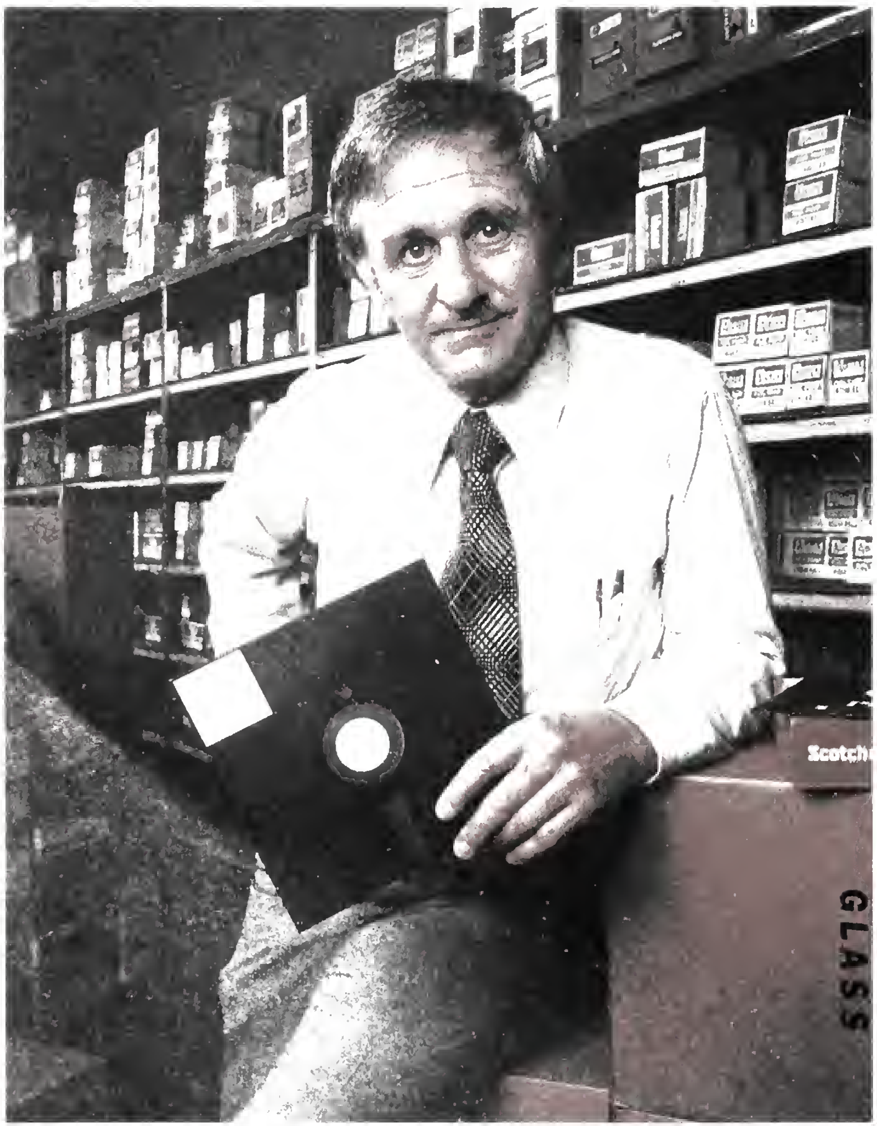
Finally the reader is directed to an excerpt from a Datapro Research Corp. report which appeared in the same issue of CW. An analysis of requirements and an objective cost analysis is unlikely to indicate an in-house data base project is reasonable.

However, do go through the exercise. You may just recognize that you do not need the power offered by commercially available packages. In that case, a stripped-down set of routines may be appropriate.

But don't expect them to be cheaper to develop than what you could acquire in the marketplace.

Robinson is an independent consultant operating as S.L. Robinson & Associates, Morrisville, Pa.

"Our inventory is our existence. Think we'd trust it to anything less than Scotch® Brand Diskettes?"



Don Stone, Vice-President,
Mass. Auto Supply Company,
Inc., Boston, Mass.

Scotch Diskettes are the diskettes you can depend upon with the information *your* business depends upon.

Each one is tested and certified error-free before it leaves our factory. Because we know nothing less than perfection is acceptable for *your* vital business data.

Scotch Diskettes are available in regular or mini sizes, compatible with almost any system.

To find out where you can find Scotch Diskettes, call toll free: 800-328-1300. (In Minnesota, call collect: 612-736-9625.) Ask for the Data Recording Products Division.

If it's worth remembering, it's worth Scotch Data Recording Products.

3M

SHOCKWATCH®

Because a disk pack can be an accident waiting to happen.

Shockwatch* is a precise impact detector which can prevent the use of damaged disk packs and cartridges.
Media Recovery Inc. 1435 Roundtable Dallas Tx 75247
Call toll free: 1-800-527-9497

CPE Effort Eases Manufacturer's DP Functions

Special to CW

SOUTH BEND, Ind. — Guessing at problems and developing possible solutions may be challenging, but being able to clearly identify problems and solutions can make life a lot easier. At least that's what Ron Gallagher, corporate manager of resource planning and technical consulting for the Bendix Corp., has found during his 11 years with the company.

Bendix operates two large regional data centers, two secondary centers and 18 stand-alone systems across the U.S. The two regional centers are located here in South Bend and in Ann Arbor, Mich., while the secondary centers are located in Sidney, N.Y., and Teterboro, N.J.

In Ann Arbor, Bendix operates a 2-byte IBM 370/155 with a Dynamic Address Translation (DAT) box to provide its users with virtual storage capabilities. Here in South Bend, the firm operates a 4-byte IBM 370/158.

"The corporation's hardware resources represent a wide array of mainframe systems and peripheral subsystems covering most of the major equipment suppliers," Gallagher said. "Since these sites do so much vital work for the organization, it's important that we understand the performance characteristics of these systems so their maximum processing potential can be realized."

Hardware Monitor Difficult

To ensure Bendix receives this maximum return from its systems, the company began doing computer performance evaluation (CPE) more than seven years ago. "At that time we had a corporate software manager interested in CPE," Gallagher recalled, "but he was interested only in terms of using a hardware monitor, so that was what we initially purchased."

But Gallagher and his staff soon found the benefits derived from measurements made with the hardware monitor did not come as easy as he would have liked: "It gives very accurate information, but it's difficult and time-consuming to install. In addition, it takes much longer to verify and analyze the data than we would like. So we were willing to give up 1% or 2% of accuracy for a tool which was more easily usable by a nonhardware technician.

"We still use the hardware monitor occasionally," he continued, "but with our limited staff, the software monitor is the better choice."

When they researched the monitors available and the areas in which they planned to use them, Gallagher and his staff eventually decided to purchase the Configuration Utilization Evaluator/Data Set Optimizer (CUE/-DSO) from Boole & Babbage, Inc.

Only the South Bend site has a permanently assigned full-time individual responsible for CPE. At the two other sites which have these products installed, systems programming and operations personnel handle the monitoring and evaluation tasks.

Summaries for Meetings

Emery Johnson, senior project leader at the South Bend site, runs CUE to constantly monitor such areas as the CPU, channel utilization and paging rates. DSO is run only on demand, when problems in disk data set placement are suspected.

The CUE reports are produced with shift summaries so that at daily production meetings, Johnson can discuss bottlenecks which have occurred in the system and how the resources are being utilized. In addition, he runs the graphics portion of the product so he can see what normal usage is and when these statistics may be getting out of normal bounds.

"For example, when I look at the paging graphics, I can quickly see what our peak paging rates are, when rescheduling of production workloads might be necessary to reduce paging or when we're going to have to have extra memory to handle the increased real storage demands," he explained.

He also studies graphic reports on such areas as channel, tape and direct access utilization as well as other significant indicators.

"When we think it's advisable, we initiate DSO to study disk volumes and head movements between data set pairs so we can reorganize our packs based on the generated reports. This allows us to reduce contention time and helps us improve the utilization of space on the disks," he said.

The only time the graphic reports go beyond the data center management, Johnson noted, is when upgrades are required. By using the reports, Bendix can forecast when additional hardware will be needed and document its justification.

CUE/DSO also helps his organization string out its upgrading requests by reducing bottlenecks and balancing the workload, Gallagher added.

To illustrate this point, he cited a problem which presently exists at an-

(Continued on Page 32)

WHAT DOES AUERBACH THINK ABOUT INTERCOMM?

THE CLAIM: In a 360/370 OS or OS/VS environment with a dozen or even thousands of terminals, our INTERCOMM will run circles around CICS or any other teleprocessing monitor. It's the state of the art in large scale TP monitors.

THE EVIDENCE: The 1977 Auerbach report on INTERCOMM. Here's the bottom line:

"Why are we so high on INTERCOMM? Mainly because it has been in the forefront of technology for so long.

"Users also share our sentiments ... all were quite satisfied with the system's performance ... and the support has been outstanding.

"CICS is not all that bad. It is not, however, in INTERCOMM's class." (Emphasis added)

We couldn't have said it better. Because INTERCOMM does more things and does them better than any other TP monitor.

Now take a second to find out why over 200 users have already opted for the world's most sophisticated teleprocessing software.

Call or write today ... (calling is faster!) Brochures on products filling your precise requirements will be in the mail the same day.

MONITOR IV INTERCOMM
MONITOR IV BETACOMM
MONITOR IV MINICOMM
DOS & DOS/VS

BETACOMM: Designed for the medium to large size 360/370 DOS/VS user using on-line program [illegible] facilities. Increases programmer productivity 50 to [illegible]

MINICOMM: For smaller DOS and DOS/VS users. Perfect 4.0 score in 1977 Datapro [illegible] for overall [illegible]

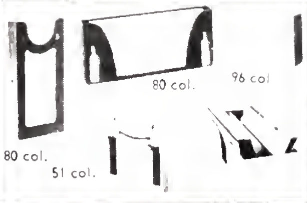
informatics inc Software Products

World's Leading Independent Supplier of Software Products

Member SIA ADAPSO

21050 Vanowen St., Canoga Park, Calif. 91304 [illegible]
267 route de Meyrin, CH 1217 Meyrin 2, Geneva, Switzerland 41 022 82 51 51
New York (212) 481-6800 Washington (703) 821-5900 Chicago [illegible]

Tabcard Holders
supplying holders for all types of D.P. systems



BEEMAK PLASTICS
7424 Santa Monica Blvd.
Los Angeles, Cal. 90046, (213) 676-1770

3M Enhances Series 4000

ST. PAUL, Minn. — The Parallel Print Extract (PP/E) program from 3M Co. is said to provide users of the company's Series 4000 Information Processor with "extensive" extraction options for list management. Multiple extracts can be performed, for example, with their output combined into a single list, a spokeswoman noted.

The Series 4000 is a minicomputer-based word processing system that can be used under software control to edit text, write letters, print labels or envelopes or prepare other forms. It reportedly has capabilities for global search and replacement, heading, footings and page numbering.

PP/E permits selection on five operator-defined positions on a CRT screen, with each position containing as many as 62 variables. The operator can extract or select a specific variable or a range of variables on each position simultaneously, the 3M spokeswoman said.

The program permits extraction by first letter/first line, first letter/last name and Zip Code simultaneously with, or independently of, the defined selection indicators or screen positions.

Names and addresses meeting specified criteria can be counted, with the total displayed. Other advantages of the $300 package include on-screen operator prompts, 3M said from Department LX8-32, P.O. Box 33600, St. Paul, Minn. 55133.

Users Can Work With Vsam Through 'Symdata' Update

NEW YORK — DOS- and DOS/VS-oriented Release 5.0 of the CA-Symdata test data generator from Computer Associates is said to support more file types than earlier versions, to include a user exit facility and to provide a selection capability that permits the tailoring of generated files.

Symdata is programming language-independent, eliminating the need to modify source programs in order to generate test data. Only three types of control commands are required to define the test file to be created, a spokesman said.

The first type of control identifies the characteristics of each field; the second, the characteristics of the record; and the third, the characteristics of the file, he explained.

Release 5.0's extensions enable users to work with Isam and Vsam files in addition to various earlier file types. CA-Symdata will read an existing file in either of these newer formats and create a file that matches the input type.

In addition, users can now extract data from an Isam or Vsam file to build a subset, the spokesman said.

The user exit facility allows the user to write modifications to CA-Symdata which can process a file in unique ways at Open, Close, Read or Write times, he continued.

With the selection capability, records originating from the user's live data file may be processed selectively to create smaller test files.

The test files created by Symdata can be on magnetic tape, disk or punched card, the spokesman noted, adding that such flexibility makes the package "extremely valuable" as well as easy to use.

CA-Symdata runs under IBM DOS and OS (and the VS counterparts) as well as CMS. It costs $4,800, he said from 655 Madison Ave., New York, N.Y. 10021

IDMS
Database Seminars

Sign Up for the Seminar in Your Area This Winter

Dates and Cities

November
30 Salt Lake City, UT
30 Washington, DC

December
5 Baton Rouge, LA
6 Detroit, MI
7 Denver, CO
7 Hartford, CT
7 Oklahoma City, OK
12 San Francisco, CA
13 Chicago, IL
13 Indianapolis, IN

January
11 Los Angeles, CA
16 Greensboro, NC
16 New York, NY
16 Vancouver, BC
18 Raleigh, NC
23 Tucson, AZ
30 Montreal, QUE
30 Louisville, KY

February
6 Pittsburgh, PA
6 San Diego, CA
8 Richmond, VA
8 San Jose, CA
13 Cincinnati, OH
13 Dallas, TX
13 Newport Beach, CA
13 Stamford, CT
15 Baltimore, MD
15 San Antonio, TX
20 Albuquerque, NM
20 Boston, MA
20 Syracuse, NY
22 Houston, TX
22 Salt Lake City, UT
27 Cleveland, OH

March
6 Indianapolis, IN
8 Portland, OR
13 Dearborn, MI
13 Miami, FL
13 New York, NY*
15 Tampa, FL
21 Toronto, ONT
22 Washington, DC
27 Chicago, IL*
27 Dayton, OH
28 Philadelphia, PA

Cullinane Corporation
Wellesley Office Park, 20 William St
Wellesley, Mass. 02181 617 237-6600

These seminars are offered at no charge to you or your organization.

IDMS seminars are tailored to management and technical personnel. They cover the Cullinane Data Management System including IDMS DB/DC, INTEGRATED DATA DICTIONARY, ON-LINE QUERY and CULPRIT Report Generator. These software products were created expressly for IBM 360, 370 and 303X computers.

These seminars are conducted by individuals with extensive backgrounds in applied database technology. The time spent at these sessions will prove of utmost value for you and your staff.

To register, call Cullinane Corporation at (617) 237-6600, or fill in and mail this coupon.

Please enroll me in your IDMS Database Seminar (at no charge) in

(City) on (Date)

Name Title

Firm

Address

City State Zip

Tel My computer is:

78112

Database: Cullinane

*[illegible] held from 2:30 p.m. to 4:00 p.m. at the Computer Caravan

CPE Effort Aids Manufacturer

(Continued from Page 31)

other Bendix site that doesn't yet have CUE/DSO installed. "They've been putting together their justification for the product, but as of right now, they are still operating without completely accurate statistical performance and workload data," he said.

"They've been having a capacity problem," he continued, "and we have theorized what the problem is, but unless there is some way of measuring the system, we can't prove where the bottleneck is and what system modification or hardware upgrade alternative is right for this situation."

More Memory?

This site is running at a high paging rate and the staff there feels that the answer is more memory. However, Gallagher noted that paging drops considerably in the evening.

"On the second and third shifts, where they don't have a high paging rate, added memory alone isn't going to solve this capacity problem," he observed. "I think what they need is a combination of more real storage and added processing power, but without the necessary statistic reports I'm only guessing."

Once this site has CUE/DSO, Gallagher feels it will be able to better optimize its existing system and develop the trends and facts it needs to justify tomorrow's system requirements.

"Once it begins daily monitoring of its workload," he concluded, "it will be able to prove to management that it is getting the most out of the existing system and providing a level of service consistent with the available resources. Then, when additional hardware is needed, the documentation and justification of the upgrade will be quite easy.

To Run With 'Supercontroller'

Nets to Offer Technology Mix, Doll Says

By Ronald A. Frank
CW Staff

NEWTON, Mass. — Networks are on the verge of offering users a mix of technologies to best meet specific applications needs, according to data communications consultant Dr. Dixon Doll.

Bell Canada has already taken steps toward integrated network offerings that combine various technologies in one service. Specifically, the Dataroute service now offers both integrated packet-switching and fast circuit switching, he noted.

Satellite facilities will be added to these integrated nets later, Doll predicted in a recent interview here.

Many users today feel that contention switches used with fast circuit-switched facilities are suited for certain applications and they will install these capabilities on their in-house networks if these facilities are not offered on public nets, he said.

Fast circuit switches such as Computer Transmission Corp.'s M3200 may introduce a longer time delay when the channel is being set up, but then this is the only technology that can provide the user with a predictable level of response time and capacity, he maintained.

Two Service Classes

Two general classes of service — two-ended and one-ended — will emerge on the integrated nets, Doll continued. Two-ended services identify both a receiving and a sending unit at the time the channel is established. Packet switching, such as the services provided by Telenet Communications Corp. and Tymnet, Inc., or fast circuit switching can be used. The response time going through the network with a fast circuit-switched facility will have more predictable delays not subject to intermediate stage queuing.

This type of channel is better suited for applications that have a predictable throughput, such as file transfers.

On the other hand, the packet-type facility is more suited to statistical or interactive uses involving varied levels of traffic.

Satellite Technology

Satellite technology can be used more extensively for broadcast-type services. Satellites are also well suited for bulk file transfers, Doll said.

The key point is that packet technology may be only a partial answer to user network needs, according to the consultant.

From the carrier's point of view, there must be other technologies to provide varied transmission environments. An example of the one-ended facility would be a datagram-type service such as that proposed for Canada's Infoswitch network.

Here the user does not have to establish the destination location in order to input the message into the network. The user would sign onto the net and declare the type of transmission desired.

Infoswitch will provide three levels of service depending on the needs of the application.

Doll noted that such integrated services are growing in number. Even Bell has given some indications that integrated offerings will eventually be part of the Advanced Communications Service, he said.

To use services involving several types of technology, the user will have to request the type of network transport technology desired when the network session is established.

At the same time, users will need the capability to go out to private network facilities as well as carrier services. These private nets would be in-house configurations based on Systems Network Architecture, Decnet and similar offerings.

'Supercontroller' to Emerge

To accommodate the varied network choices available to the user, there will emerge a supercontroller that goes way be-

(Continued on Page 34)

On-Line Net to Keep Records Straight for Canadian Hotels

By Ronald A. Frank
CW Staff

TORONTO — Keeping accurate records is important for hotel managers. A room unsold today is revenue lost forever.

Computerized back office information is vital for a hotel to operate efficiently. But when 24 locations with 28 properties are involved, an on-line network is the only way to keep things running smoothly.

For Canadian Pacific (CP) Hotels, a data communications network is replacing various manual recordkeeping systems in order to optimize operations in its coast-to-coast chain.

The hub of the planned network will be in Toronto at the Royal York Hotel, which is one of the major facilities in the CP Hotel chain, according to Brian J. Hall, executive director of systems.

The company has installed dual IBM System/3 CPUs to handle back office operations including general ledger, cash control, accounts receivable and other functions that must be tracked on a real-time basis by hotel management.

Infocall Network

In order to connect its widely dispersed sites into a network, CP Hotels has decided to use the Infocall service from Canadian National Canadian Pacific (CNCP) Telecommunications. The Infocall network will allow CP Hotels to get the benefits of packet technology without having to rewrite existing hardware and software routines, Hall explained.

CW Photo by R. Frank

Abdul Amarshi checks System/3 at CP Hotels' DP center.

The company installed dual System/3s early in 1977 and is now on the verge of automating its hotel sites by providing intelligent terminal workstations to its dispersed

(Continued on Page 36)

CLIP AND RETURN FOR FAST RESPONSE

acoustic couplers

for a variety of terminals

☐ **Series 150A**

300 baud, 31 models
Available for a variety of terminals — Teletype, Digital Equipment Texas Instruments

$147

with tape interface

302C2-13

Data rate to 300 baud
Magnetic tape interface
Operates with audio recorder
Provides block and record markers

$425

with universal interface

Series 302A,B

300 baud, 19 models
Simultaneous EIA/20ma interfaces
Hardwire options
Optional interfaces

$245

☐ **300 - 1200 baud modem** ☐ **2400 - 9600 baud modem** ☐ **Limited distance modem**

Check modems of interest and return to us for additional information

name ____
company ____
street ____
city ____ state ____ zip ____
telephone ____ ext. ____

ComData

8115 Monticello
Skokie, IL 60076
312/677-3900

New York
212/267-3696

member of IDCMA

Los Angeles
213/624-0550

Terminals Put Order at Control Division Site

OWATONNA, Minn. – To administer the specialty maintenance tool programs for large farm equipment manufacturers and their dealers, the Service Tools Division of the Owatonna Tool Co. processes more than 500 orders a week.

To help keep track of the orders for maintenance tools, the division uses a key-to-disk terminal system.

"The system is a real boon for us," operations manager Bill Ahrens said, "and it's a relief to the corporate DP department. Besides serving the DP needs of the company, the headquarters DP group also handled the division's daily orders and shipping orders plus maintained the customer files and updated the equipment listing of all the line items.

In December 1977, a number of factors, including an order entry rate that had doubled in three years, led Ahrens and systems analyst Mike O'Neill to abandon the division's keypunch system in favor of a Data 100 Corp. Keybatch system with three CRTs.

"For us," Ahrens commented, "it means that we are no longer subject to the occasional two or three day delays of the company's month-end closings, annual inventories or our own rush orders. We found that we were suddenly the masters of our own destinies. We could smooth the flow of paperwork, decrease the amount of errors and be more responsive to our users."

Now two operators key in order data via the terminal keyboards. Using specially designed programs – from order and customer numbers to prices, taxes and discounts to transportation and order status – the Keybatch system guides the operators through the data entry process.

As the operators key in the data by entering a single-digit code number instead of a longer, descriptive phrase, the data is compared against tables in the system's five million-character disk storage device, ensuring it is within acceptable ranges prescribed by the system.

Because of the increased data entry speed, the operators now have more time to devote to other duties such as credit verification, obtaining new customer account numbers and updating the account record. Not only do the operators key in the order entry information, they also maintain the customer files and enter daily shipping information.

Accountability for Accuracy

Along with increased performance, error rates have also decreased significantly, Ahrens noted. "It used to be demoralizing when the headquarters DP department gave us the error listings," Ahrens said. "It was assumed that if there was a mistake, we had made it. In many cases, that just wasn't so. Now the paper never leaves our offices – the operators have total accountability for the data and its accuracy."

Thus far, the operators have scored high marks, and error rates are consistently below 1%. One month the errors rose to 6-1/2% but a daily follow-up edit procedure immediately caught and identified the problem. Once the error was identified, it was a simple matter of the operator doing the "job out" procedure over again – simply and quickly with little effort and no loss of order entry information.

The greater productivity of the Data 100 terminal system has helped Ahrens create greater goodwill among customers and improve cash flow for the division, Ahrens said. "If a dealer has a tractor that needs repair, he doesn't care about our problems.

Computer Optics announces a new 3270 feature.

Flexible short term leases with Immediate Delivery

Computer Optics can deliver a complete 3270 replacement installation—CRT displays, remote and local controllers, printers. And we can deliver tomorrow, the next day or as soon as you need it.

Computer Optics is totally dedicated to 3270 series replacement systems.

Minicluster systems that handle up to eight tubes or printers in a remote location. Maxiclusters, either local or remote, for up to 32 tubes or printers on one controller. All are plug-to-plug compatible with IBM equipment.

We've always saved you money over your IBM 3270 costs. And now we can also offer you a lease term plan to meet your needs.

If you can't wait a year to expand your present display installations, or if you'd simply like to reduce your display costs, call Computer Optics immediately.

After all, time is money.

Computer Optics Inc.
Berkshire Industrial Park, Bethel, CT 06801

Regional Offices: Parsippany, NJ (201) 263-1161, Boston, MA (617) 237-4343, Chicago, IL (312) 454-1822, Dallas, TX (214) 387-0025, Irvine, CA (714) 752-6104, Palo Alto, CA (415) 328-2601, Washington D.C. (301) 974-6649 Toll Free: 800/243-1314 In Connecticut call 1-744-6720 collect

Nets to Offer Technology Mix

(Continued from Page 33)

yond anything available today," according to Doll. On the user's side of this supercontroller there will be mainframes, minicomputers and PBXs, while on the network side there will be satellite facilities, SNA facilities and industry nets like Swift.

The supercontroller will be supplied by independent vendors like Collins and Northern Telecom. This new controller will be to the data user what the watboxes and Infoswitches have been to the voice user, he predicted.

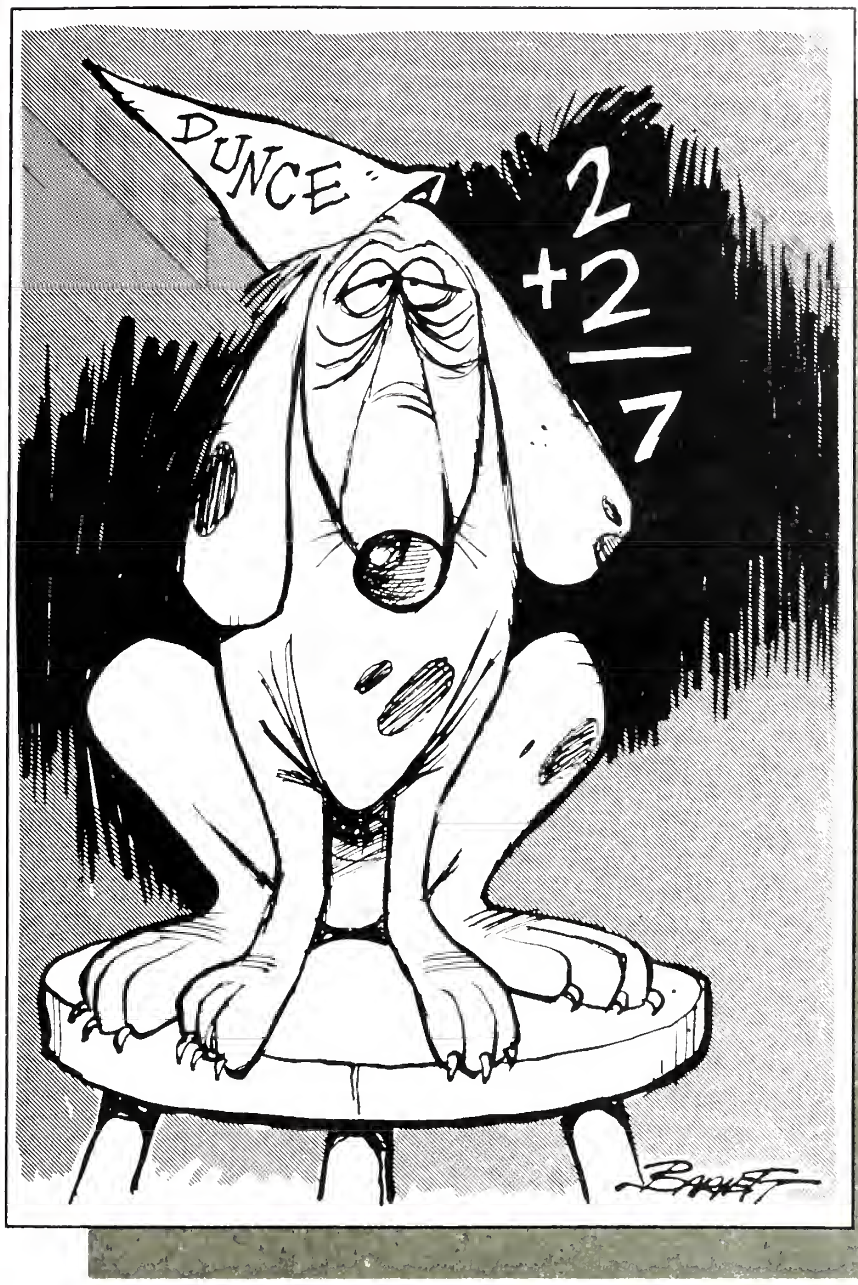
The SL-1 digital PBX from Northern Telecom is an early example of the supercontroller since it has the same kind of technology. But even though it is an advanced device, the SL-1 does not yet have the multifunction capability the new breed of supercontrollers will have. "It is a digital switch and it has the flavor of what is coming," Doll said.

Contention Switch

The supercontroller will be a high-level contention switch that is not really protocol-sensitive. It will make the required physical connections to a specific network facility and then the individual protocol-sensitive modules in the various nets will be provided by those who interface to the networks.

The recently announced processor by CTX, Inc. that takes Binary Synchronous Communications devices and makes them compatible with an X.25 network is a step in the direction of the supercontroller, Doll said, although it is not yet the entire answer.

The basic technology needed for the supercontroller is already available, he noted, but what is needed is the "brave system integrator" who will mesh product capabilities now provided by many suppliers.



YOU CAN'T TEACH AN OLD DUMP/RESTORE NEW TRICKS.

Look at the dump/restore products on the market today. They all do just a fantastic job of dumping and restoring about any type of file you can think of — except one — VSAM. VSAM is very different. It is a highly complex new technology access method which requires very special handling; the type of handling the old guard dump/restore products are just not capable of. FAVER is the only product available today which devotes itself to the care of VSAM files. FAVER is loaded with features which include:

- **High-speed dump**
- **Aggregate cluster reference**
- **Device and catalog independence**
- **Automatic cluster redefinition**
- **Comprehensive integrity checks**
- **Backup tape verification facility**
- **Simplified JCL and control cards**

FAVER's high speed dump is truly high-speed. We put FAVER up against its leading competitor plus IDCAMS and here's how it came out:

	FAVER	Leading Competitor	IOCAMS REPRO	IOCAMS EXPORT
Elapsed time (MM.SS)	13 21	57 08	58 39	1 06 03
CPU time	7·29	42 11	51 48	51 38
Start I/O's	20,061	32,527	30,674	28,741
JCL cards	9	103	150	150
Control cards	2	48	96	96

If you're interested in cutting your VSAM backup times while gaining the utmost in data integrity, send in for a free FAVER trial. FAVER for DOS/VS can be leased for $60/mo. or $1,944 for a permanent lease.

Now here's the deal of the century:
Within six months after you receive a trial, if you find a competing product you like better than FAVER, we will refund every cent you've paid us and let you cancel your lease. That's how confident we are in our product.

GOAL SYSTEMS

"The CPU Savers"

Call us today at 614-268-1775 or send in the attached coupon.

GOAL SYSTEMS CORP.
P.O. BOX 29481
COLUMBUS, OHIO 43229

GS

Please send me: ☐ a free trial
☐ more information on FAVER

Name
Title
Company
Phone
Address

Seminar Slated

NEW YORK — A seminar examining the correct user approach to implementing a DP/data communications strategy will be held by the Yankee Group Dec. 5-6 at the Harvard Club here.

Using a case study method, the two-day session will look at models of implementation, discuss "avoidable mistakes" and evaluate new technologies and their applications.

The presentations will cover such topics as building the applications, organizing the DP-data communications operation, planning and control and "internal marketing."

The seminar costs $550. Further details are available from The Yankee Group, Box 43, Cambridge, Mass. 02138

Network Keeps Records Straight

(Continued from Page 33)

locations. The workstation includes an Ontel OP/1 CRT with 10K bytes of random-access memory and programmable read-only memory Prom storage that can emulate 3277 protocol functions, Hall said.

The System/3 CPU in Toronto will be able to poll the remote terminals which look like IBM CRTs operating with 3270 protocol.

Asked if there was any significance in CP Hotels' decision to use CNCP's network service, Hall said the Hotel group operates separately from the carrier. "We deal strictly at arm's length," he explained, adding that if there had been more cost-effective services elsewhere, he would have selected another solution.

To reinforce his point, Hall said IBM had suggested a net of 3275 terminals in a multidrop private-line configuration, but this would have been several times more expensive than the Infocall approach.

Printers for On-Line Access

The workstations are provided by CNCP as part of the network offering. The intelligent CRTs will include Centronics Data Computer Corp. 306C printers to give each hotel on-line access to the corporate DP center at the Royal York.

Each terminal will be used for both local 3270 operations and on-line transmissions. Specially designed front-end versions of the terminal will convert the 3270 output into 1,200 bit/sec Ascii data for transmission to the System/3. According to Hall, the terminal workstation will cost $375/mo with an additional $80/mo for each terminal access, and this is more cost-effective than other solutions.

Although 1,200 bit/sec may seem like a low transmission rate for the terminals, Hall noted that the average time for the CPU to answer a remote site is "eight to nine seconds." In addition, the local mode printing capabilities is a feature that would not be available with IBM terminals.

Initially the system will be programmed for revenues, cost of sales and similar back office functions, according to Tom Adhoch, senior programming analyst, but later room reservations and other applications will be added.

The System/3 CPUs operate with IBM's Communications Control Program (CCP) to poll the remote terminals. The applications programs are being written in RPG-II, and the screen formats are being designed for simple use by relatively unskilled operators who typically will be working on the corporate controller's staff at each of the hotels.

Hall would much rather keep his four programmers busy with applications software development than worry about teleprocessing software. The Infocall service was attractive because it is transparent to all existing hardware and software procedures, he noted.

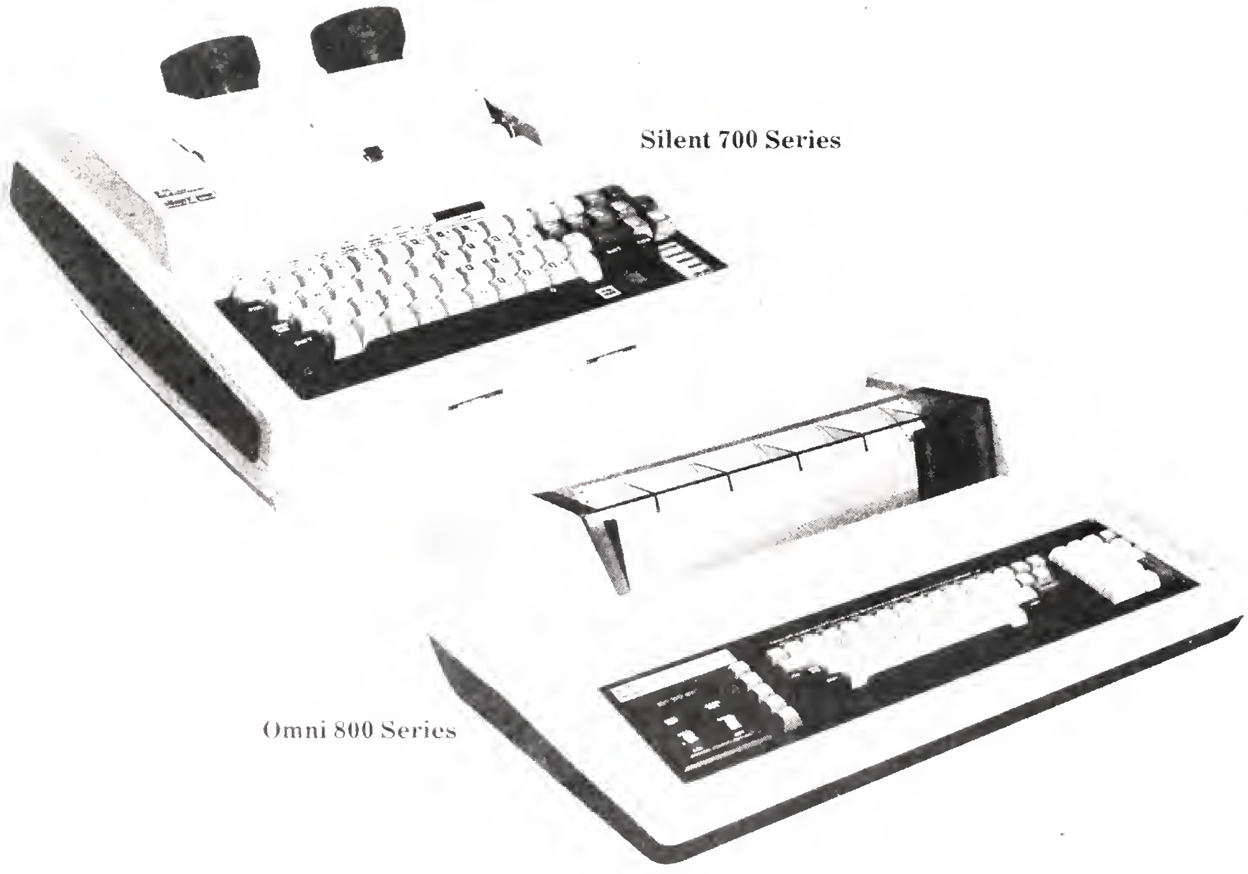
Possibilities for Future

The System/3s each have 512K bytes of storage of which 300K bytes will be devoted to the recordkeeping system now in its final stages of development.

Hall accepts the possibility that implementation of all planned applications could cause the DP center to outgrow the System/3s. CP Hotels has been looking at alternative CPUs, and the IBM System/38 may provide the necessary additional capability, but a final decision has not yet been made.

Before installing the present CPUs, CP Hotels was using time-sharing facilities at Computer Sciences of Canada.

As the on-line Infocall applications begin to operate on the net, increasing amounts of needed data will be available on a real-time basis, Hall said.



The perfect combination.
Texas Instruments terminals.
Texas Instruments Supply.

- Complete line of Texas Instruments terminals and accessories in stock.
- Immediate delivery on *all* popular models – 733 ASR, KSR (300 & 1200 BAUD), 743, 745, 763, 765, 810 and CRT's – video display terminals.
- Nationwide service. Coast-to-coast locations.
- Technical support – before and after sale.
- 90-day Limited Warranty. On both parts and labor.
- Hands-on demonstrations at Midcon/78.

Texas Instruments Supply Locations:

PACIFIC COAST
San Francisco (415) 392-5700
Sunnyvale (408) 732-5555
Portland (503) 223-2953
Honolulu (808) 955-2617
Los Angeles (213) 973-2571
Orange County (714) 979-5391
San Diego (714) 292-7101

MIDWEST
Chicago (312) 640-2964
Milwaukee (414) 784-3040
Cleveland (216) 464-2435
Dayton (800) 362-1320
Cincinnati (800) 362-1320

MID-ATLANTIC
New Jersey (201) 382-6400
(609) 964-6644
Long Island (800) 631-7335
Philadelphia (215) 586-4300
Washington (800) 631-7335
Binghamton (800) 631-7335

NEW ENGLAND
Boston (617) 890-0510
Connecticut (203) 281-4669

SOUTHWEST
Dallas (214) 238-6882
Ft Worth (817) 332-9361

Austin (512) 258-6681
San Antonio (512) 226-4194
Houston (713) 776-6511
Tulsa (918) 582-8272
Kansas City (816) 753-4750
Oklahoma City (405) 239-2194
Denver (303) 751-1785

Or use this TOLL-FREE number: (800) 527-7678

TEXAS INSTRUMENTS
SUPPLY COMPANY

1978 Texas Instruments Supply Company

MCI THE TERMINAL KING
PROMPT DELIVERY - IMMEDIATE STOCK
12-24 MONTH FULL OWNERSHIP
36 MONTH LEASE

Description	Purchase Price	Per Mo 12 Mos
TI 743 KSR Portable	1,345	125
TI 745 KSR Portable	1,725	160
TI 763 KSR Memory	2,595	240
TI 765 KSR Prtble. Mry.	2,895	270
TI 810 Printer 150 CPS	1,795	170
TI 820 Printer KSR	2,395	223
TI 733 ASR	2,995	278
TI 770 1 Int. Terminal	4,475	418
TI 770 2 Int. Terminal	5,485	510
Qume LTR Qual KSR	3,095	290
Qume LTR Qual RO	2,695	255
Hazeltine 1400 CRT	825	78
Hazeltine 1500 CRT	1,145	107
Data General 6052 - CRT	1,595	150
Data General Dasher Ptr.	1,395	135
Data Gnrl. LP2 180 CPS	2,795	260

QUANTITY PURCHASE PRICES
ON REQUEST
FOR ALL YOUR TERMINAL &
COMPUTER NEEDS

METRONIX COMPUTERS INC.
3769 NW 51 ST. MIAMI, FL 33142
305 - 633-6010

Consider Cin

We offer an interactive, on-line data base query facility so easy to use - it's almost child's play.

Experience gained from serving over 2,000 TOTAL® Data Base Management System (DBMS) users worldwide has taught us that the success of a DBMS is measured by how rapidly the data resource can be transformed into end-user information.

For many types of information requirements, traditional programming techniques are a time-consuming, costly bottleneck. Cincom's new query facility eliminates this programming need for both ad hoc and repetitive inquiries into the TOTAL® DBMS. It provides prompt decision/action information to non-programmer personnel in a logical format.

As proof, we tested our query facility's ease of use with a random group of children. They mastered the basic inquiry capability in less than two hours. All functions in less than a day. If you consider this type of increased productivity and visibility, this type of bridge over the programming barrier, to be important to your data processing group, shouldn't you consider Cincom?

We're located in 42 cities. In 14 different countries. And on every continent in the world except Antarctica. Contact us for additional information.

U.S.A. 2300 Montana Avenue Cincinnati, Ohio 45211
(513) 662-2300

International 17-19 Rue Montoyer 1040 Brussels, Belgium
(02) 511-65-48

Cincom Sys

® The TOTAL Information Systems People.

"Through distributed processing with the IBM Series/1, we're giving stronger support to our 1,060 Datsun dealers."

Today, more and more companies are turning to distributed processing to put computing power where the work gets done. At 12 regional offices and two other locations of Nissan U.S.A., the national distributor of Datsun cars and trucks, IBM Series/1 computers are helping make possible a swift response to the needs of 1,060 Datsun dealers.

"At each of the regional offices, dealer orders for parts are entered in the local Series/1, which analyzes them for accuracy," says John R. Cola, director of information systems. "Needed data changes can then be made on the spot. After further processing by a System/370, documents are prepared by the Series/1 for quick shipment of the orders to the dealers.

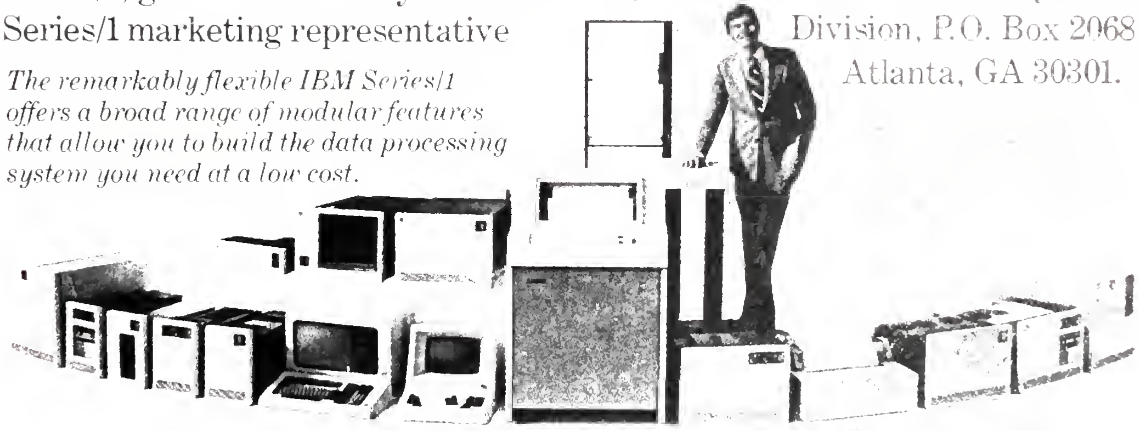
"Similarly, the processing of the dealers' monthly financial statements, each of which includes over 600 items, is expedited by our Series/1 network," adds Mr. Cola. "We believe this kind of close regional control of data through distributed processing is vital to our objective of topnotch service to our dealers and their customers."

The IBM Series/1 is small enough to fit almost anywhere, flexible enough to manage a variety of data processing tasks and powerful enough to handle both remote termi-

John R. Cola, Director of Information Systems, Nissan Motor Corporation in U.S.A., Carson, California

nal and central information processing. It features online capability so that information is available to you at any terminal just as quickly as it's processed. And because it's modular, Series/1 is ready to grow when you are. What's more, Series/1 is supported by an extensive service organization that enables IBM to respond promptly to your service needs, even in remote areas.

If you'd like to know more about how your company can benefit from Series/1, get in touch with your IBM Series/1 marketing representative or write the IBM General Systems Division, P.O. Box 2068, Atlanta, GA 30301.



The remarkably flexible IBM Series/1 offers a broad range of modular features that allow you to build the data processing system you need at a low cost.

A small computer can make a big difference.

Tymnet Extends Service

CUPERTINO, Calif. — Toll-free access to Tymnet, Inc.'s public packet communications network has been added in 13 cities, bringing to more than 150 the total number of local access locations. These are complemented by nationwide Wats coverage, the company said.

Tymnet has also added its 31st location with 1,200 bit/sec local terminal access support. Since April, the company has added 1,200 bit/sec access in 10 cities including Portland, Ore.; Louisville, Ky.; New Orleans; Seattle; El Segundo, Ca.; Phoenix; Darien, Ct.; Hartford, Ct.; Baton Rouge, La.; and Memphis, Tenn.

The latest local access locations include Nashville, Tenn.; Lexington, Ky.; Hayward, Ca.; Chattanooga, Tenn.; Charleston, S.C.; Knoxville, Tenn.; Jackson, Miss.; Greensboro, N.C.; Manchester, N.H.; Columbia, S.C.; Spokane, Wash.; Fresno, Ca.; Savannah, Ga., and Plymouth, Mich.

Tymnet's international access also has expanded with the addition of Austria, Italy, Hong Kong and Singapore. Tymnet service now is available in 15 foreign countries through international record carriers and postal, telephone and telegraph authorities.

Approval for service from at least three other countries is expected before the end of 1978.

The "full-time" terminal system

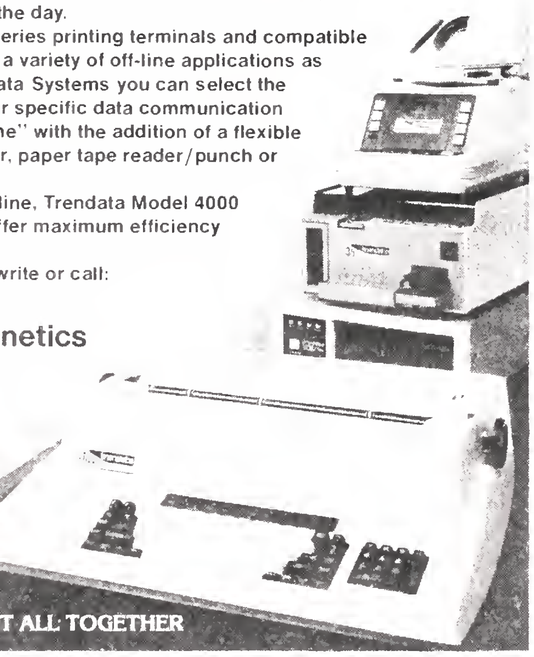
If your data communications terminal is only on the job when communicating with the host computer system, you may be paying for a lot of wasted hours during the day.

Trendata Model 4000 series printing terminals and compatible peripheral products satisfy a variety of off-line applications as well as on-line. With Trendata Systems you can select the terminal model to meet your specific data communication needs. Then, use it "full time" with the addition of a flexible disk, tape cassette recorder, paper tape reader/punch or tab card peripheral.

Whether on-line or off-line, Trendata Model 4000 Series Terminal Systems offer maximum efficiency and greater flexibility.

For more information, write or call:

Applied Magnetics
Trendata
610 Palomar Avenue
P.O. Box 5060
Sunnyvale, CA 94086
(408) 732-1790



NEW PERFORMANCE MONITORING SYSTEM

Response time and line utilization from the communication RS-232C interface. This modular system tailors performance monitoring to the user's needs including communication protocols and time-stamped statistics.
Pricing from $3660 U.S. dollars FOB Salt Lake City, Utah.

MODEL 500
QUESTRONICS, INC.
3565 South West Temple Salt Lake City, Utah 84115 (801) 262-9923

Emulators Tie Harris 8000 To Three Makers' CPUs

DALLAS — Enhanced communications emulators to interconnect Harris Corp. 8000 series intelligent terminals with most Honeywell, Inc., Univac and Burroughs Corp. mainframes have been announced by Harris' Data Communications Division.

Revised software releases of the Univac and Burroughs protocol emulators already have been field tested and put in use at customer sites, and additional revisions to all three emulators are scheduled for the next six to 12 months, the firm said.

The revisions in Harris' emulators will handle the hardware and software introduced in recent months by the mainframe manufacturers, a spokesman said. They reportedly include capabilities for queued transaction handling, local format storage, remote printers and random-access disks and diskettes.

Harris' 8770 terminal system now provides data entry and retrieval compatibility with Honeywell's 7760 diskette-based interactive terminal and with VIP 7700R/7705R terminals, which replaced the VIP 7700 series. The 8770 is supported by Honeywell 200/2000, 400, 600, 6000 and 60 series computers and front-end controllers under the MSR/2000, OS/2000 and Gcos operating systems; the emulation will be available in June.

Harris' 8210 terminal system emulates Univac's Uniscope 100 and 200 terminals and the UTS 400. It is supported by Univac's 1100 and 9000 series mainframes and by Series 70 and 90 units tying into Univac, CTMC or DSC communications controllers.

Software compatibility is provided for the OS/3, OS/4, OS/500 and 1100/OS operating systems. The 8210 also is being used with the 1100 series with Exec8 and on 9000s with MCP and IMS; it will be available in January.

Harris' 8220 terminal system now emulates Burroughs' TD830 interactive terminal and the earlier TD800 and TD820 versions. It is supported by all Burroughs mainframes and front ends, including the B1700, B2500 and B4800 series and the B6700, 6800 and B7700, all under the MCP operating system and NDL communications.

The cost of the emulation features has been bundled with that of each terminal, the spokesman said, from the Data Communications Division, 16001 Dallas Parkway, Dallas, Texas 75240.

Dataroyal IPS Line Gets Unit Offering 150 Char./Sec

NASHUA, N.H. — Dataroyal, Inc. has introduced a higher speed addition to its IPS-7300 line of intelligent hardcopy terminals. Priced at $4,675, the 150 char./sec IPS-7326 complements earlier units with 120 char./sec output rates, according to a spokesman.

The IPS-7326 combines a matrix printer with an 8-bit programmable microcomputer. A movable data input station consisting of a gas discharge display and Ascii keyboard is also standard on the system.

Its microcomputer architecture allows the 7326 to be programmed to meet specific application requirements and then reprogrammed when those requirements change by plugging in programmable read-only memory (Prom) chips, the spokesman explained.

An IBM 2848-compatible serial interface is standard on the IPS-7326 and a 20mA current-loop interface, as well as other serial interface types, are available as options. The firm is at Main Dunstable Road, Nashua, N.H. 03060.

Service Eases Car Recalls

BEDMINSTER, N.J. — A Bell System national account group team working with Ford Motor Co. personnel has helped develop a nationwide communications service to help Ford and Lincoln-Mercury dealers determine the recall status of any Ford vehicle built since the 1968 model year.

The service is called the Computer-Assisted Recall System (Cares). A team of Long Liners working in Dearborn, Mich., with the Ford Parts and Service Division contributed a year and a half of effort to develop the system.

"Cares is one of several components to help Ford streamline its recall procedures," according to Robert Gross, Bell System national account manager.

The system ties a dealer into a system that can tell within seconds if a vehicle is subject to recall for either mechanical or emission problems.

To use the system, a dealer using a telephone with a Touch-Tone pad calls toll-free to an IBM 3033 mainframe and punches in a code identifying the vehicle. The CPU then responds through a Periphonics T-Comm/7 audio response system with information about the vehicle's recall status.

The service is the result of a team effort in which the Bell account team helped Ford develop the prototype dealer worksheets and provided a technical assistance hotline for Ford parts and service personnel.

"In the past, consumers and dealers had to depend on mailed information. With this system, a dealer can answer a question about recall in a matter of seconds," Gross said.

The system is also a money-saver for Ford. "The system resulted in a $250,000 savings over what time-shared computer alternatives would have cost. Because Ford owns the system, it will be possible to add customer and dealer services in the future with little or no problem," Gross said.

The service will be available to each of Ford's approximately 6,600 dealers. It will function Monday through Friday, from 6 a.m. to midnight.

Efficiency the Aim

'Networking' Has Many Meanings, One Goal

By Patrick K. Phillips
Special to CW

With the industry just beginning to dig out from one of the most massive promotional campaigns ever to accompany a single technological concept — distributed DP — users are again being barraged by a new term: "networking."

The term has alternately been used to describe a collection of systems, connected to each other and a host computer, connected to each other only or connected to a host computer only. Depending on the definition, the systems may either be cable- or communications-connected.

Whatever definition one chooses, however, the objective of networking is the same — to connect products in the most efficient manner possible to solve DP and communications problems.

In most cases this means remote systems not only need to be compatible with each other, but with mainframe manufacturers' systems as well. Users should not be expected to modify the software in the mainframe to accommodate differences in communications protocols for a variety of terminals on the primary (system-to-host) communications network.

Product Connection

Both a primary network and a secondary ring, or subnetwork, can exist within a network. On the primary ring (the first level removed from the mainframe), systems are interconnected via single lines from a mainframe to individual systems (point-to-point) or via multipoint lines from the mainframe to several systems.

The choice of protocols used in the primary network depends on a number of factors, including traffic and types of peripherals as well as host processor configuration requirements.

Looking beyond the primary network, a secondary network can be established in which second-level terminal systems communicate with primary terminal systems. Where the primary terminals are used to provide store-and-forward data to the mainframe, the secondary network terminals can be used to provide data entry or transaction-oriented activities for input to the primary terminal.

Systems should not only allow effective communications with the host processor via the primary communications network, but should also provide both batch and interactive communications in the secondary communications network.

Secondary Networks

Within the past 12 months the communications and processing capabilities of terminal systems on the primary communications network have grown more sophisticated. Today's terminals at the upper end of the capability spectrum include operating systems and multitasking capability — allowing concurrent high-level execution along with communications — as well as having the capability to support remote terminals which can be used for source data entry, program preparation, and other tasks.

A secondary network provides the means for remote workstations to be attached to the primary terminal and run as if they were locally attached. Once the workstation is placed at a remote site, a need has been created to print reports at the remote location, thus creating a need to ship "batch" data to the secondary site.

Users should expect and are entitled to receive reliable communications between the primary terminal and the secondary or subsidiary terminal. This implies synchronous transmission with more sophisticated error-checking and retransmission capabilities than that provided under asynchronous discipline. Thus the primary terminal has become a minihost.

Three Benefits

As terminal systems have become more sophisticated and user needs for DP have grown, the pendulum has swung back from the strong central mainframe point of view. Some of the applications performed on the mainframe are off-loaded to terminal products at remote sites. This provides three beneficial effects for the user.

First, the mainframe is unburdened of some of the workload. Second, the network is freed of a few traffic requirements — particularly those of an interactive nature — thus saving substantial network communications cost. Third, the belief is returning that source data entry should be the responsibility of the local division.

The transmission of data to a central site for processing when results are needed back at the originating site is a waste of communications resources. The use of communications facilities for a simple DP function such as data entry or program preparation is likewise a waste of resource for the network owner.

The terminal network owner must constantly look for ways to reduce the communications and processing requirements. They go hand in hand and must be optimized together, not individually.

Because of technological advancements in software engineering, hardware and communications protocol, users can expect to see terminal systems and terminal-based networks continue to grow with the inclusion of additional functions. This can occur by expanding the terminals themselves into multiprocessor systems, connecting them by more and more sophisticated communication protocols.

Software, both vendor-supplied and user-written, will become more easily available with the advent of higher level languages, producing more reliable and sophisticated software products for terminal processors.

Smaller, lower-cost and more sophisticated hardware will in turn allow larger multi-processor terminal offerings. Functions which are now forced to fit into a single processor in a multiprocessing or multitasking mode — such as volume data entry (key-to-disk), source data entry and remote job entry — will migrate into separate processors in a multiprocessor system accessing a common data base.

This data base will be resident at a primary terminal node and will in turn be accessed by "remote remote" (or subsite) terminals. Users will request and pay for incremental functions by connecting additional processors to the terminal network at appropriate locations.

More sophisticated communications protocols will allow interactive and batch access from both secondary and primary terminal sites to all important nodes in the network. Communications technology will improve and begin to minimize communications cost.

Because of hardware technology advance, this implies that in a large terminal network even the most simple terminal product at the farthest remote location will be able to perform such sophisticated tasks as compression, error checking and correction and encryption.

Communications sophistication will allow terminals to become logical units rather than physical units in terminal product networks. Terminals will in a sense become remote peripherals to mainframes.

All the indicators are that the 1980s will bring a dramatic increase in network size, in the number of terminals installed at the far-flung reaches of user locations and in the variety of richness of functions and applications provided on those terminal offerings.

Phillips is director of product planning at Data 100 Corp., Minnetonka, Minn.

payroll limping?

Too many small programs • Too many read/writes of old-fashioned segmented records • Too many discrepancies between redundant master files • Too many interface programs that don't interface • Too much thrashing of old-fashioned codes • Too many half-astute answers to today's EEO, OSHA, and ERISA needs.

Sounds like you should discuss up-to-date Payroll/Personnel/ERISA software for your Wang/IBM/Honeywell with Joe Nestor (617) 851-4111, Wang Laboratories, Inc., Lowell, MA. 01851.

WANG

The "time-saver" terminal system

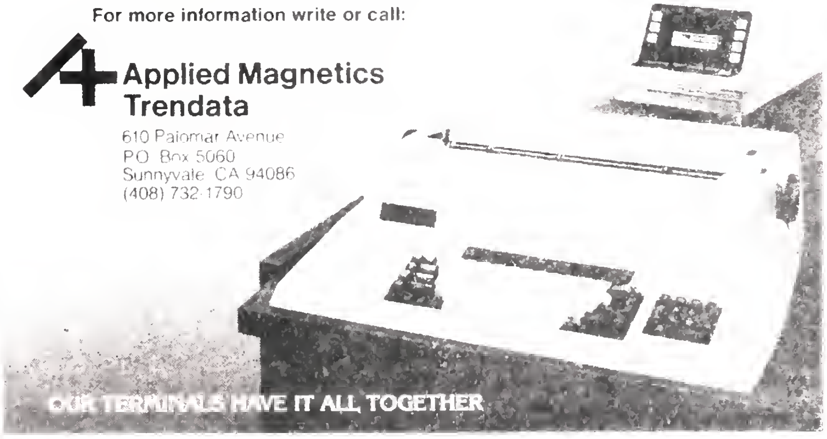
If your terminal system isn't working for you both off and on-line, valuable time is being wasted and it's time for a change.

Combine a Trendata Model 4000 Tape Cassette Recorder with a Trendata Model 4000A or Trendwriter Terminal and you'll save both time and money.

Using this versatile accessory storage subsystem, you can format, edit, and correct data off-line. High speed transmission can take place later in batch mode at substantial savings in line charges. The 4000 TCR also records data from a remote CPU. Plus you can access up to 4800 addressable tape positions.

For more information write or call:

Applied Magnetics
Trendata
610 Palomar Avenue
P.O. Box 5060
Sunnyvale, CA 94086
(408) 732-1790



Clearance Sale

COMPUTER TERMINALS

VIDEO DISPLAY/CRT's

TSI

LINE PRINTERS

TELETYPES

Sales — Service — Rentals
New — Used

TERMINAL SYSTEMS INC

714 738 4444
800-423 2449
outside CA only

213 769-6772
415-573 7722

Sweda Offers Restaurant ECRs

PINE BROOK, N.J. — Sweda International, a division of Litton Industries, has introduced two electronic cash registers (ECR) — the 4610 for lounges, taverns and smaller restaurants and the 4620 for larger fine-dining establishments.

The microprocessor-based ECRs were designed for heavy use in demanding environments and reportedly offer high flexibility in application, selection and management control.

In bar and lounge applications, the Model 4610 offers 25 preset departments and simultaneous operation by two clerks, with the printing of separate media totals through "B" keys. This feature may be tied into an optional second cash drawer.

In fine-dining applications, the Model 4620 offers 100 preset departments through Sweda's "paging" keyboard — by turning a page on the keyboard, the operator can change departments (menu items), which saves valuable keyboard space, a spokesman said.

Model 4620 options include an additional 100 departments and precheck control for up to 16 servers, with individual server sales totals, that allows the 4620 to be used as a precheck unit or both.

Members of the L-45 series, both machines offer 170 price lookups; previous balance and service; the calculation of two different taxes automatically and another tax manually; calculation of waiters' and waitresses' tip totals; production of 10 department reports, in which each department can report to three different groups at one time and, through an optional check number control system, the tracking of up to 128 checks at one time, with a report on outstanding checks.

Standard features of both the 4610 and 4620 include descriptors of up to six alpha characters; nine tenders, for cash, check and seven charge cards or miscellaneous tenders; an alphanumeric operator display; an illuminated keyboard; a real-time clock; programmable check endorsement; a "journal low" indicator; true-customer count capability; and programmable chit printing for departments and/or tips.

An auxiliary battery to provide backup power is offered as an option on both registers.

Prices start at $2,795 for the 4610 and at $2,995 for the 4620. First deliveries are scheduled for February from Sweda at 34 Maple Ave., Pine Brook, N.J. 07058.

Terminal Queries Clients For On-the-Spot Surveys

COSTA MESA, Calif. — MSI Data Corp. has introduced a data entry terminal that reportedly offers quick customer feedback. The unit, called Tellus, was designed to monitor consumer attitudes on-the-spot in such places as hotels, supermarkets and hardware stores.

The "push-button questionnaire" will offer another option to companies seeking customer feedback, an MSI spokesman said. Methods such as personal interviews, telephone canvassing, comment cards, mail surveys, market share studies and financial indexes can be prohibitively expensive, too slow to provide timely remedial efforts or often elicit too small a response.

With Tellus, a customer can answer a set of 11 questions in 30 seconds, and the unit "doesn't intimidate customers or provoke a confrontation," the spokesman added.

The initial marketing effort for Tellus will be in the lodging industry, with possible future use in restaurants, department stores, financial institutions, airlines, car rental agencies and market research organizations.

Questions to be asked and the customer's available responses are specified by the purchaser and can be changed at any time.

The terminal is a self-contained unit that can be used in any high-traffic area, MSF said.

Data can be displayed on the unit itself or on a series of preprogrammed reports printed on an optional 12-column printer.

Another option permits a user to collect and store information for later transmission to a CPU for statistical analysis.

Costs range from $1,500 for the basic Tellus unit to a maximum of $3,000 with options. First deliveries are scheduled for next spring.

MSI Data Corp. is at 1381 Fischer Ave., Costa Mesa, Calif. 92627.

Spectron Lowers Datascope Price With $1,900 Cut

MOORESTOWN, N.J. — Spectron Corp. has reduced the purchase price of the D-301 Datascope monitor from $6,800 to $4,900.

In announcing the price reduction, Spectron said the large number of orders for the D-301 since its introduction earlier this year "has enabled the company to increase its production plans and thus reduce the price of this Datascope monitor."

The D-301 is a portable, general-purpose data communications line monitor that provides a full-duplex display of transmit and receive data. It features independent line discipline set-up for transmit and receive sides of the line.

Full-duplex data at transmission speeds up to 72K bit/sec can be stored in a 262K-bit electronic buffer. A search of the buffer contents using a user-selected argument of up to four characters is standard.

Displayed data can be frozen, and the code, bit order, right or left justification (for less than 8-bit characters) and location of highlight markers can be changed.

Spectron is at 344 New Albany Road, Moorestown, N.J. 08057.

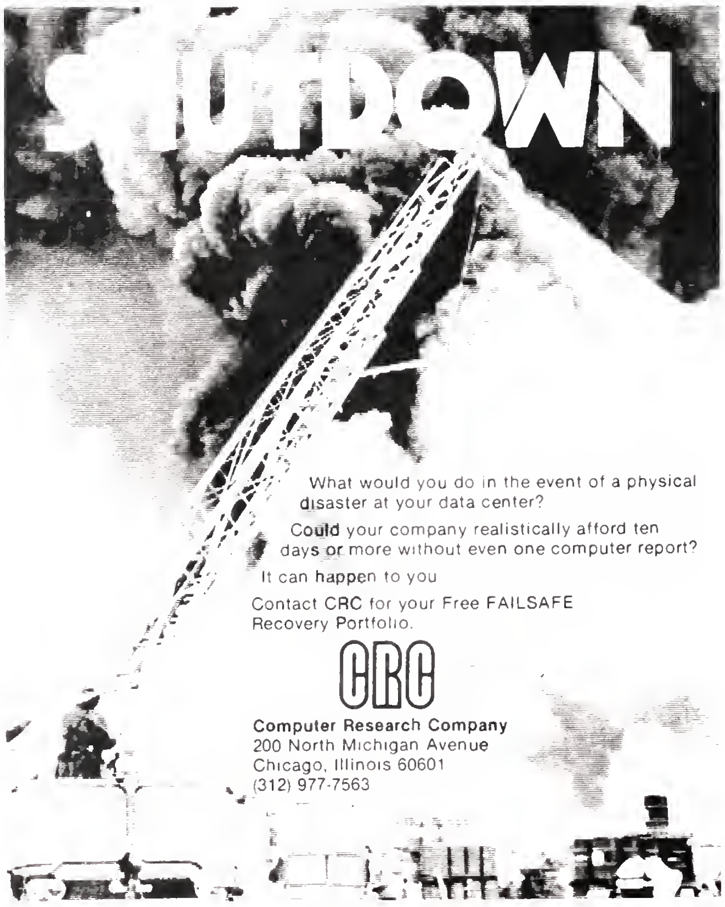
TAC Unit Compatible With IBM System/7

ATLANTA — Technical Analysis Corp.'s (TAC) Label/300 1C/S7 is said to emulate the addressing and message sequences of the Dataroyal, Inc. IPS-7 using a communications protocol compatible with the IBM System/7 as it is defined for remote peripherals (IBM 2848, 2260 and 1053).

The Label/300 can be used as a replacement or alongside the Dataroyal without any changes in system software or in communications hardware.

The product retains all the special printing features of the Label/300, uses an RS-232 interface and supplies all signals necessary for operation with a Bell 202C or similar modem.

The Label/300 is available for $8,500 from TAC at 120 W. Wieuca Road N.E., Atlanta, Ga. 30342.



What would you do in the event of a physical disaster at your data center?

Could your company realistically afford ten days or more without even one computer report?

It can happen to you

Contact CRC for your Free FAILSAFE Recovery Portfolio.

CRC

Computer Research Company
200 North Michigan Avenue
Chicago, Illinois 60601
(312) 977-7563

With Productivity Gain

Bank, Employees Cash in via Key-to-Disk

Special to CW

AUSTIN, Texas — How can you pare salary levels and, at the same time, increase employees' take-home pay, boost productivity and reduce turnover? City National Bank, with assets of $390 million, has found a way to accomplish all this, while still keeping employees happy.

After changing some equipment and revamping structures as a result of those changes, the bank has increased its volume of business, decreased its error rate and made performance evaluation and administration easier.

In addition, the bank feels it is attracting more motivated, more productive employees, while discouraging the less competent ones. "Our production/pay system attracts good operators and discourages poor ones. Our guaranteed hourly rate is set relatively low, and unless an operator is good enough to earn production pay, all he makes is that guaranteed hourly rate," according to Ken Johnson, marketing services representative for the bank.

"The way our system is structured, good operators can earn a lot of production pay and enjoy high hourly rates. Now I believe we have the fairest salary plan possible," he said.

The bank was able to carry through this plan by replacing its card-handling equipment — keypunches and key verifiers — with a key-to-disk data entry system.

Other measurable effects of the change were an increase of roughly 34% in data entry production and an associated cost reduction.

Johnson said [illegible] objectives when it [illegible] disk system. "We [illegible] improvements in the quality of [illegible] for our own bank and the services [illegible] banks. In addition, we [illegible] of our production," he noted.

(Continued on Page 48)

CW Needs Your Output

Getting useful information into the hands — or eyes, or ears — of users efficiently will always be one of the major goals of DP. Since output is often one of the slowest aspects of DP operations, it is among the most challenging, important problems users face. If you have met this challenge, here's your chance to tell other *Computerworld* readers how you did it.

"Computer Output Equipment" will be the theme of a special report to appear in the Feb. 26 issue of CW.

We want to hear from you. Are you using plotters or graphics in your operation? How about voice-output, microfilm or color graphics CRTs? Have you found a better output method?

Contributors should send us about four typewritten, doublespaced pages describing the problems they faced, how they handled them and what results they got. Articles or questions concerning them should be addressed to Howard A. Karten, Computerworld, 797 Washington St., Newton, Mass. 02160 (617-965-5800). All material must be received by Jan. 10.

System Axes Time Involved In Processing Union Benefits

UTICA, N.Y. — At least one union here is not worried about automation and has in fact turned to computers in order to serve its membership better.

"Computers are basic business tools that pay off in efficiency and cost savings. They are neither frivolous nor a luxury," according to Joseph C. Talarico, president of Amalgamated Meat Cutters, Butcher Workmen and Affiliated Crafts of North America, District Union Local No. 1 here.

Talarico says that all of Local 1's computer programs are keyed to the goal of making the union more responsive to its members.

Twenty-three Honeywell, Inc. 7760 CRT terminals are on-line to a Honeywell Level 64 computer at the union headquarters primarily to permit fast information [illegible].

"But more important than the speed provided by the system," Talarico said, "is the fact that all the information regarding a union member's benefits status is current and accurate."

Talarico sees Meat Cutters Union Local 1 as a trend-setter. "As far as we know, we are the only union our size that has totally computerized its operation in-house," he said. "We're able to offer a full range of progressive services to our members only because of our efficient computer system."

Talarico credited Local 1's DP manager Mark S. Stone, with originating and developing the complex, efficient array of pro-

(Continued on Page 44)

VA Opens DP Center

Max Cleland (in wheelchair), administrator of veterans affairs, and W.R. Martin (right), assistant administrator for data management and telecommunications of the Veterans Administration (VA), inspect the computer room of the VA's new Hines DP Center in Maywood, Ill.

"How can you buy a computer terminal from anyone else without first calling us?"

When you dial 800-645-8016 you'll find out we've not only got experts whose know-how can save you money on your terminal applications, you'll also [illegible] we've got the sharpest pencils in town on such famous brands as [illegible] Diablo, Teletype, Techtran and more. With a full service organization to support whatever we sell. Or lease.

So call us. Corporations, bankers, brokers, accounting firms and government organizations are all MTI customers because nobody beats our price.

mti 159 Northern Boulevard, Great Neck, N.Y. 11021 800-645-8016

Union Axes Time-Consuming Processing

(Continued from Page 43)

grams used to solve management problems as well as to serve the 14,000 union members.

Talarico initiated Local 1's credit union five years ago when he was vice-president. That was before the computer. "It took us weeks to prepare quarterly reports for 1,000 members," he said.

Memberhip Boom

But with Stone's arrival in 1975 and the union's initial lease of the Level 64, membership grew rapidly. In the last five years, Local 1 has had the fastest growth rate of any credit union in the Northeast — and one of the fastest in the country, Talarico said. Today, nearly half of Local 1's 14,000 members belong to its credit union.

"Because of the efficiency of our computer operation, we can compete with all the local banks serving our members, who are spread out in 47 counties in three states," Talarico said. Checks go out the same day as share withdrawal requests are phoned in, and loan checks are mailed the same day the application arrives in Utica. "We've been able to offer new-car loans at 8% when banks were getting 10% to 11%, and used car loans at 9% when banks get 18%," he said.

Up-to-date quarterly reports are now generated on the Level 64 in a few hours. Year-end statements were in the mail to 7,000 members by Jan. 4, Talarico noted.

Money Refunded

Another benefit Local 1 offers its union members is reimbursement for prescription drugs. When the union went "self-insured" — rather than having an insurance company underwrite the program — Stone designed the claim form so that it serves also as a keying document. All information that needs to be keypunched is shaded on the form. "It makes the job fast and easy for our keypunch operations," he said.

Safeguards were built into the computerized drug-check issuing procedure to ensure that a check cannot be written for a fraudulent claim.

Another member benefit, which Talarico calls a "first in our industry and one of the first in the country on this scale," is a prepaid legal plan. Totally self-funded through employer contributions, the plan allows members a specified number of hours of free legal counsel for wills, house purchases, estate planning and so forth.

"The secret is running the union like a business. I'm responsible for management of our dues-payers' money," he said. "I use the computer to provide member services and to provide myself with information I need to make intelligent management decisions."

Apparently he does it very well. Local 1 has been rated in the top .5% in the country in terms of investment performance.

President Talarico called Stone to his office one day and said, "I'm thinking of offering a maternity benefit program for part-time employees. What is our potential liability?" In four hours, Stone had the report on Talarico's desk.

Stone has a penchant for neatness. His keypunch cards are color-coded to avoid possible confusion. For example, cash cards have a blue stripe on the edge, claims processing have green, and credit union checks are red-coded. Batch cards and job cards are coded with the same color.

His documentation is neatly organized in three indexed volumes. Complex checks and audit controls are built into each program. His rerun rate? "About 10 a year," he said.

Local 1 owns its Level 64 with 256K bytes of main memory, three MSU 4000 disk drives, 23 7760 CRTs, four tape processors, a 1,200 line/min printer and a 1,050 card/min card reader.

The Bantam.
The cocky new $599* CRT that just changed the pecking order.

User Need	Feature	P-E BANTAM	LSI ADM-3A	Hazeltine 1400	Hazeltine 1500	Adds Regent 100
Easy to read display	7 x 10 matrix for highly legible characters	Yes	No	No	Yes	No
	Black on white or white on black display	Yes	No	No	Yes	Yes
	Display set deep in hood to reduce glare	Yes	No	No	No	No
	Full 24 x 80 display	Yes	Yes	Yes	Yes	Yes
	Full upper and lower case	Yes	Option	No	Yes	Yes
	Non-glare screen	Option	Yes	No	Yes	Yes
High operator throughput, low operator fatigue	Tab stops/tab key	Yes	No	No	Yes	Yes
	Backspace key	Yes	No	No	Yes	Yes
	Repeat key	Yes	Yes	No	No	Yes
	Shiftlock key	Yes	No	No	No	No
	Separate print key	Yes	No	No	No	Yes
Convenient switching Local/on-line	Local – remote key	Yes	No	Option	Option	Yes
International Character sets	French/German/Swedish/Danish/British/Spanish	Option	Option	No	Option	Option
High speed numeric	Integrated numeric pad	Yes	Option	No	Yes	Yes
Convenient system interfacing	RS-232/CCITT-V24	Yes	Yes	Yes	Yes	Yes
	Current loop	Option	Yes	No	Yes	Yes
Simplified program debugging	Transparent mode and displayable control characters	Yes	No	No	No	No
Faster maintenance	Self-test	Yes	No	Yes	No	Yes
Minimum desk space	Small size	15Wx 19Dx 14H	15.5Wx 20.2Dx 13.5H	15.5Wx 20.5Dx 13.5H	15.5Wx 20.5Dx 13.5H	21Wx 23Dx 14.5H
Printer port	Printer port	Option	Yes	No	Yes	Option
Cost effectiveness	Qty. 100 OEM price	$599†	$740	Less than $550 in quantity 1000	$860	$895

*In quantities of 100.
†Qty. 1, End User Price $966.

AUERBACH

IT'S 11 PM. DO YOU KNOW WHO'S IN YOUR COMPUTER FILES?

Call or write (Dept. 104)
AUERBACH Publishers Inc
6560 North Park Drive
Pennsauken, NJ 08109
(609) 662-2070

AUERBACH

Imaging Meet Planned

BOSTON – The Institute for Graphic Communication, Inc. will present a conference on "Imaging Industries Over the Next Decade: Trends, Opportunities, Threats and Forecasts" on Dec. 3-5 at the Andover Inn in Andover, Mass.

The conference will discuss digital hard-copy printers, extended reprographic systems, multifunction terminals and automated prepress systems, a spokesman said.

Sessions will include such topics as "Impact of Major Trends on the Next Decade of Imaging," "Electronic Threat to Conventional Photography and Imaging" and "Forward March of Facimile and Electronic Mail."

Further information can be obtained from the institute at 375 Commonwealth Ave., Boston, Mass. 02215.

Runs at 1,000 Line/Min

Printer Extends Chaintrain Line

MALDEN, Mass. – Data Printer Corp. has announced an addition to its printer family, the Chaintrain Model 1210, which it claimed offers a 1,200 line/min printer's features for the cost of a 1,000 line/min printer.

Using a horizontal moving font line technique, the 1,000 line/min printer is said to provide precise vertical print alignment. A 64-character print set is standard on the device and character sets of 48, 96 and 128 characters are optional.

Full Line Buffering

Full-line buffering is also provided on the microprocessor-controlled unit, the company indicated and the unit can accept six part forms from 3.5- to 19.5 in. wide. A motorized upper and lower tractor aids in precise print alignment.

The Chaintrain 1210 costs $14,675. A free 30-day in-house trial is available for interested parties, the company said from 99 Middlesex St., Malden, Mass. 02148.

High End Added To Taurus Series Of Badge Readers

LAMBERTVILLE, N.J. – Taurus Corp. has added a high end to its series of hand-operated, self-contained badge and card readers without moving parts. The solid-state unit can be easily interfaced with a wide range of host systems, a spokesman claimed.

The Model H-68 is capable of reading up to 68 standard card columns. An optical reading system using infrared LEDs and the absence of moving parts are said to contribute to a long product life and minimum maintenance.

Units Can be Customized

Available as a free-standing or panel mountable unit, the H-68 and the other three models in the series can also be customized by the company, the spokesman noted.

Readout on the devices is column-serial and row-parallel. Various forms of output formatting including bit-parallel Ascii and Teletype code are available.

The devices sell for $375 in quantities of one to 24 and $295 in multiples of 100, Taurus said from Academy Hill, Lambertville, N.J. 08530.

Scopus Unveils Short-Reel Tape

LOWELL, Mass. – A lightweight, short-footage line of computer-length tape recently introduced by Scopus [illegible] all standard tape drives and weighs [illegible], according to the company.

Use of the 150-ft, 3.5-in. [illegible] Mini Reel results in [illegible] mailing and shipping charges, a spokesman said.

The Mini Reel comes with a [illegible] cover and costs $4.[illegible], the company said from 710 Chelmsford St., Lowell, Mass. 01851.

(402) 392-2606
VOLUME DATA ENTRY SERVICES
TAPE OR CARDS
QUALITY AT A LOWER COST
AMERICAN KEYDATA
Mid America Plaza, Suite 144
7171 Mercy Rd. Omaha, Ne 68106

Nobody ever offered you a tough, high quality, compact CRT like the BANTAM before. At $599 or any price. Designed for hectic office environments. And, human engineered to make an operator's life easier.

You get everything you need for cleaner input and faster through-put. An upper and lower case character set displayed on a sharp 7 x 10 dot matrix. A full 24-line by 80-character screen. A complete, sure-touch keyboard with shadow numeric pad.

You get complete tabbing. Full cursor addressing. Repeat, backspace and shiftlock keys. A transparent mode with displayable control characters to simplify host program debugging. And, a self-test mode for easy maintainability.

And, you get everything your operators need to make their jobs a joy. A hooded display that cuts glare. A wide bandwidth monitor for sharp images everywhere on the screen. Below-the-line character descenders to make reading easier. A switchable white-on-black or black-on-white display, whichever your operator prefers. An easy-to-find cursor that frames the entire character position in a transparent, inverted video block.

Plus plenty of options you can't get with CRTs costing much more. Like our low-cost Pussycat page printer. A full range of foreign language character sets. We even have a model you can switch from ASCII to full overstrike APL.

But that's not all. The BANTAM's compact good looks fit any decor. It's handsome enough for executive row and rugged enough for the stockroom. Silent? The BANTAM's fan-free design makes it quieter than an electric typewriter. And, the BANTAM only weighs 28 pounds.

Only an industry leader like Perkin-Elmer could do it. We designed a powerful, custom LSI controller chip that makes the BANTAM the one and only high quality CRT in its class.

But see for yourself. Use the comparison chart. Learn why we're so proud to add this $599 CRT to the 250,000 peripherals that bear our good name.

And, remember our terminals come equipped with a No Hassle, 800 toll-free service phone number.

One call does it all. We give you service *where* you need it, when you need it. We're there. Not just "worldwide," but wherever you are.

For more information call or write Perkin-Elmer Terminals Division, Randolph Park West, Route 10 & Emery Avenue, Randolph, N.J. 07801 (201) 366-5550. Or contact any of our sales offices. Then watch the feathers fly.

The Bantam's available at all these places

PERKIN-ELMER SALES OFFICES
Santa Clara, CA (408) 249-5540.
Tustin, CA (714) 544-9093.
Atlanta, GA (404) 393-8440.
Arlington Heights, IL (312) 437-3547.
Waltham, MA (617) 890-1305.
Oceanport, NJ (201) 229-4471.
McLean, VA (703) 827-5900.
Singapore, Republic of Singapore 2200949
Sydney (North Ryde), Australia 887-1000.
Toronto (Mississauga), Canada (416) 677-8990.
Slough, England 753-34511.
Paris, France 664-1858.
Munich, Germany 089-753081.
Schiphol-Oost, The Netherlands 020-458-269.

PERKIN-ELMER SERVICE CENTERS
Randolph, NJ; Oceanport, NJ; West Long Branch, NJ; Rochester, NY; Boston, MA; Hartford, CT; Philadelphia, PA; Pittsburgh, PA; Washington, DC; Atlanta, GA; Orlando, FL; Cleveland, OH; Dayton, OH; Englewood Cliffs, NJ; Detroit, MI; Chicago, IL; Minneapolis, MN; Kansas City, KS; Tulsa, OK; Dallas, TX; Houston, TX; Denver, CO; Phoenix, AZ; Seattle, WA; San Francisco, CA, Los Angeles, CA; Orange County, CA; San Diego, CA.

PERKIN-ELMER
Data Systems

"In a very few years, a computer with the capabilities of an IBM 3031 will fit in the palm of my hand."

Pierre Lamond
Technical Director

"National Semiconductor has been a force in semiconductor technology almost as long as there's been a technology. For the past decade, we've worked at fitting as many functions on a chip of silicon as possible—a practice that's helped computer costs drop to 1/100th of what they were just 10 years ago.

Right now, the degree of sophistication is remarkable. From individual transistors, we've progressed to the point where we now turn out total 'systems on a chip.' By 1985, a computer roughly equivalent to an IBM 3031 mainframe could fit on a single one-quarter-inch square chip.

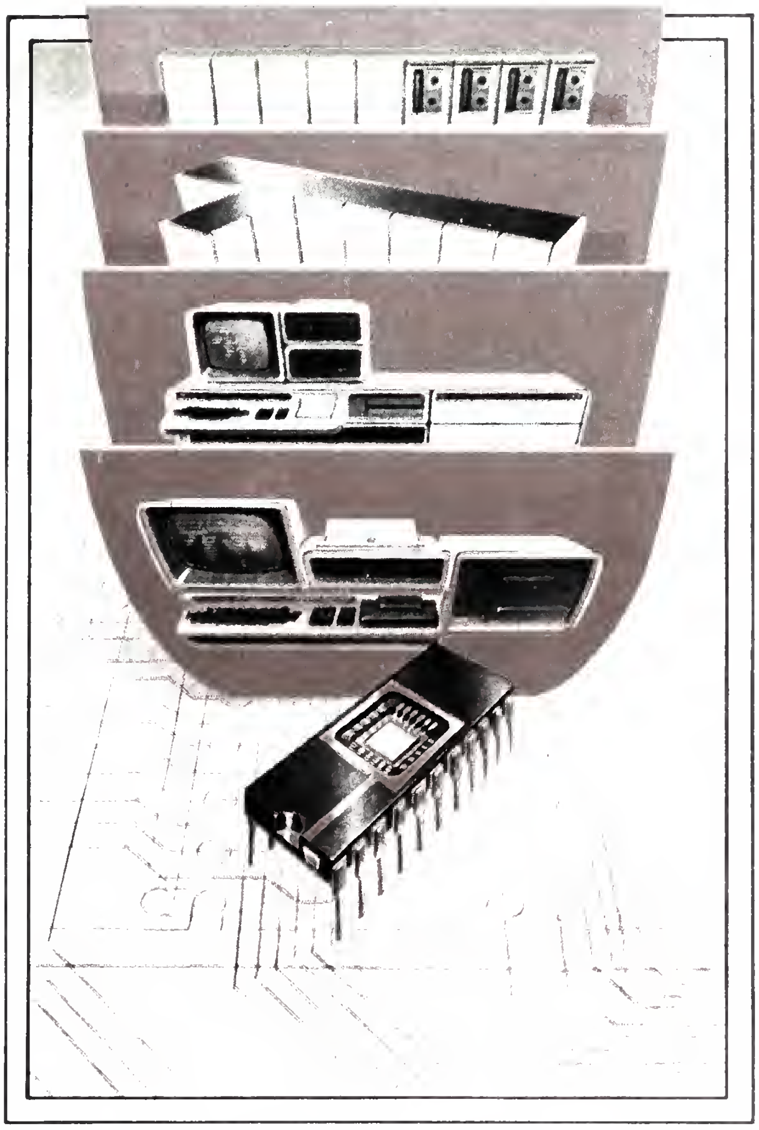
It is this kind of technological leap that's led National to enter the computer systems market. We figure that as long as we're generating system level technology, it makes sense to produce full computer systems as well.

Driven by user needs.

Before ever introducing a computer product, National wants to be certain of one thing—that it serves its intended customer. One way of guaranteeing this is to make sure the product answers as many user problems as possible. And since we're not hooked into obsolescent methodologies or designs, we can do that very well.

An example is our new Starplex™ computer—a table-top, modular, well-integrated development system with all the capabilities of a computer that would have filled a room ten years ago. Many formerly complex programming rituals now take mere keystrokes.

System/400 is another case in point. It gives users the very real advantage of being able to run existing industry standard 370 software on a minicomputer. So mainframe computing power is possible at a fraction of the cost.



And not only do we build add-on memory systems, in many cases we build the IBM-equivalent mainframes to which they attach. This means we can design even the most minute components to carry out incredibly specific tasks in highly-integrated systems of our own making. As a result, customers get degrees of performance, reliability and price they won't find anywhere else.

None of our computer products would have been possible without breakthroughs like sophisticated bit-slice microprocessing; low-cost, volume-produced memory and logic; and the large-scale use of microcode — three examples of the semiconductor technology that's rapidly blurring the dividing line between chips and systems.

This technology makes it natural for a 'chip' company like National to move forward and integrate into boards, microcomputers, minis and large-scale systems. And provide ever-increasing user benefits by doing so.

New wave technology.

We've been doing a lot of talking lately about a new wave computer technology. Actually, this is simply the latest manifestation of National placing more and more functions in less and less space. The ultimate result is that we can offer users complete systems for less money than many traditional computer companies — a fact that should make the next decade a period of substantial growth and profitability.

If there's more I can tell you about National Semiconductor, and the directions we'll be taking in the next ten years, I'd be glad to fill you in. Write me personally: Pierre Lamond, Technical Director, National Semiconductor Corporation, Drawer 19, 2900 Semiconductor Drive, Santa Clara, California 95051."

Computer Products Group
National Semiconductor Corporation

Bank Personnel Cash in Using Key-to-Disk

(Continued from Page 43)

Immediately after the bank installed the equipment, Johnson collected production statistics for a period of two months without mentioning this to the data entry supervisors. These statistics, including error rates and hourly keystroke rates, have been incorporated into a production standard.

Operators receive additional pay when they top the standards, and a worker's pay is calculated by a statistics package on the mainframe and reported to each operator on his weekly report.

Johnson said the operators reacted favorably to the production/pay plan.

Now the operators set goals for themselves, and since those goals are backed up by money incentives, there is something to work for," he said. "And we don't mind paying the extra salary when we have top-quality operators who are worth it."

In addition to increasing production and efficiency, the statistics package eliminated some of the bank's personnel problems.

"In the past, salary reviews were based on performance evaluation made by the key entry supervisor," Johnson stated. "If an operator didn't agree with that evaluation, we had the potential for conflict.

Variations in Difficulty

Johnson acknowledged that not all data entry jobs are equally demanding. In particular, he noted, jobs with a lot of alpha information, or ones with smaller input forms, are more difficult. To account for these differences, such jobs are weighted at 1.5 times the actual keystroke rate; thus, an 8,000-stroke "difficult" job is considered equivalent to a 12,000-stroke "easy" job. This means such jobs are no longer shunned, Johnson indicated.

The bank is using an 11-station System 1200 key-display system from Mohawk Data Sciences of Parsippany, N.J. The 48K-byte configuration also has a 1,600 bit/in. tape drive and automatically collects statistics as each job is done.

Linda Williams, data entry supervisor, said that operators adapted easily to the system. "All they have to do is follow the instructions of the prompting display. . .even though we had a lot of support from the vendor, we were able to do most of the training ourselves."

In mid-1977, the bank developed a statistics package to allow the system to collect more data and thus give it greater control over production. As a result, it now has access to a breakdown of each operator's production as well as overall production reports.

Monthly and weekly reports show any work that was not verified, an analysis by operator and an analysis by each individual key entry source document.

Using the information, the bank redesigned the layouts on the key entry source documents for three major applications totalling 25% of its data entry volume.

"We have absolute control over our production," Johnson said, "and we have unbiased information on which we can evaluate a key entry operator's performance.

"In addition, each operator's work is broken down so we know his or her strong and weak areas," he said. "We give this report to each operator so he can take advantage of this information.

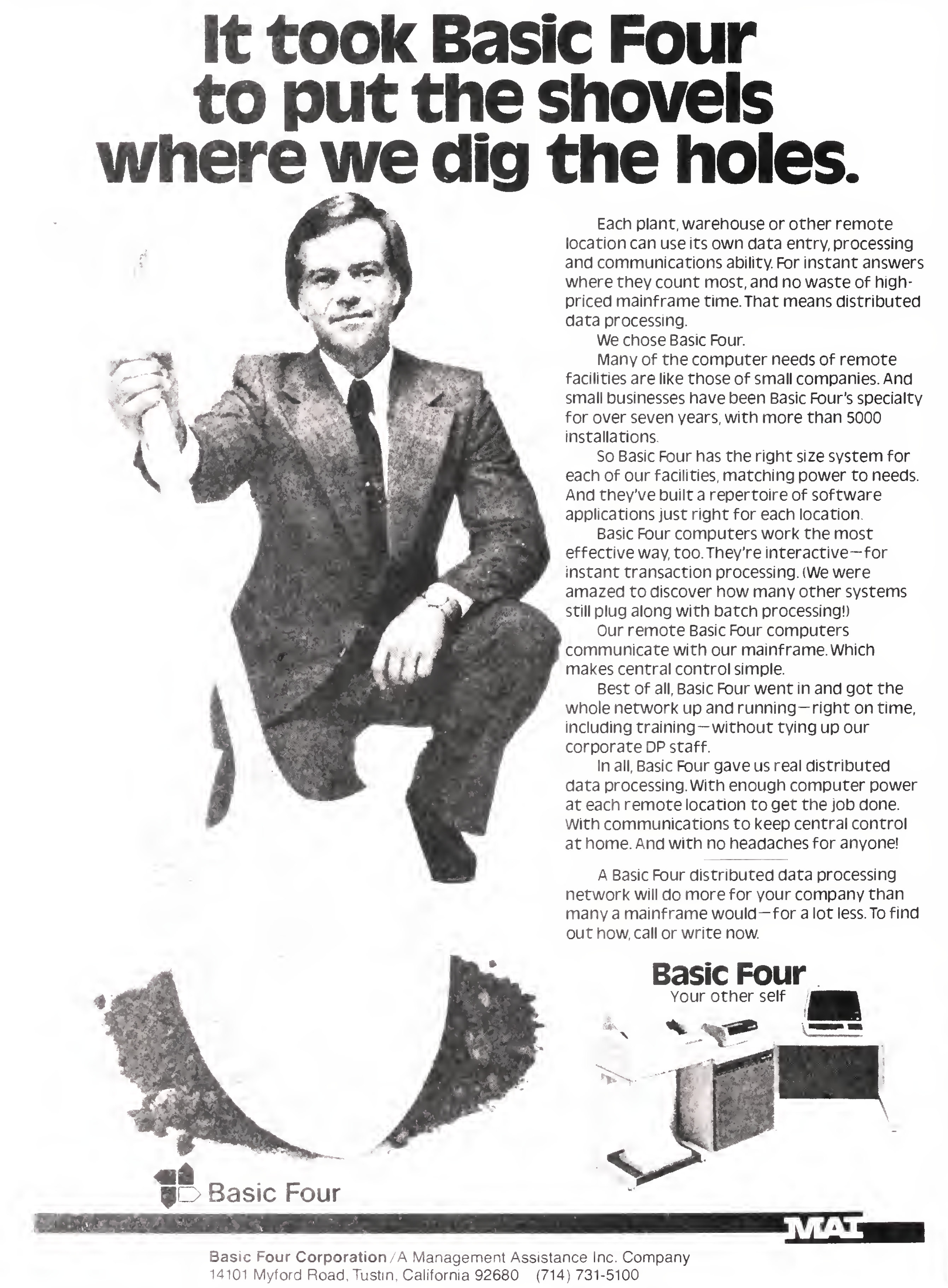
"With thie refinements of our operations and the production/pay plan, our overall key entry productivity jumped 34% in six months," Johnson said. "Our overall shop average is much more than 12,000 keystrokes per hour."

Johnson cited the customer loan application form as a prime example of the bank's former production problems. "We tested our best operators and they could not break 10,000 keystrokes per hour," he said. "We found that the input was in a difficult sequence for our operators to key.

"The form was rewritten and the data entry formats redesigned — and now our average production for that job is more than 14,000 keystrokes per hour," he said. "Many of the improvements in key entry forms and procedures are accomplished with no software changes of any kind on the mainframe. For example, one feature of the system allows operators to enter data in a format that is different that the actual physical layout; the system then automatically reformats the data when it is dumped to tape," he explained.

The bank has no immediate plans for upgrades. "We are now enjoying the benefits of the equipment," Johnson said. "Our production is up and the error rate is the lowest we have ever experienced. In addition, we know exactly what is being done.

"Finally, we have a pleasant work area with no noise, and the operators are happy and working fast, but accurately, to take advantage of the production/pay plan," he said.



It took Basic Four to put the shovels where we dig the holes.

Each plant, warehouse or other remote location can use its own data entry, processing and communications ability. For instant answers where they count most, and no waste of high-priced mainframe time. That means distributed data processing.

We chose Basic Four.

Many of the computer needs of remote facilities are like those of small companies. And small businesses have been Basic Four's specialty for over seven years, with more than 5000 installations.

So Basic Four has the right size system for each of our facilities, matching power to needs. And they've built a repertoire of software applications just right for each location.

Basic Four computers work the most effective way, too. They're interactive—for instant transaction processing. (We were amazed to discover how many other systems still plug along with batch processing!)

Our remote Basic Four computers communicate with our mainframe. Which makes central control simple.

Best of all, Basic Four went in and got the whole network up and running—right on time, including training—without tying up our corporate DP staff.

In all, Basic Four gave us real distributed data processing. With enough computer power at each remote location to get the job done. With communications to keep central control at home. And with no headaches for anyone!

A Basic Four distributed data processing network will do more for your company than many a mainframe would—for a lot less. To find out how, call or write now.

Basic Four
Your other self

Basic Four

MAI

Basic Four Corporation/A Management Assistance Inc. Company
14101 Myford Road, Tustin, California 92680 (714) 731-5100

155-II
Up to two megabytes with DAT.
Sale or Lease
COMDISCO®
312-698-3000

Lack of Products Causes Delays

User Endures Eight-Month Switch to DDP

Special to CW

NEW ORLEANS — When E.R. Squibb and Sons, Inc. decided in 1974 to convert from IBM 360/20s at nine branches to a minicomputer-based distributed data processing (DDP) system, much of the needed hardware and software was unavailable from vendors, according to Joanne Finch, manager of the Minicomputer Services Department at Squibb.

Difficulties arose from the lack of vendor products and the time it took central site batch programmers to grasp the nature of on-line systems. Despite these problems, the Squibb system was implemented only eight months late and is now performing well, she told a workshop at International Data Corp.'s recent conference on DDP here.

Finch advised users considering conversion to DDP to select a vendor carefully and to interview other users since they may provide excellent guidelines. One should also be sure that plans apply to the company's needs and that technical compatibility requirements — for example, terminals interfacing with operating systems — are met.

Design Changes

Systems are not always static in design, and Squibb's scheme was no exception. The original plan called for replacing the 360/20s at the nine branches — which provided on-line order entry — with Digital Equipment Corp. PDP-11/40s.

The nine branches would be restructured into five branches and four satellites. Thus the new plan bore little resemblance to the original one.

While the changes were being made, the users at the branches decided it would be advantageous to expand the scope of the systems' jobs, so the plan was changed to five PDP-11/70s, each with 512K bytes that would send daily updates via IBM 2780 emulation to the central 370/155.

Meanwhile, Squibb had set up a task force with a representative user who provided valuable input and kept the users at the branches involved. While the project did not determine when it would freeze specification changes, it did try to keep on top of vendors' developments.

Series of Problems

Some of the problems Squibb encountered appeared major, but whenever something was not available from a vendor, the Squibb DP department tackled the task. Often this amounted to a dead end because a vendor would offer an equivalent product by the time the Squibb team devised its solution.

In many cases, Squibb preferred vendor offerings that would not require in-house support.

In retrospect, Finch thought the project could have been finished in the same time frame if it had been started a year later.

The Squibb plan was committed to the DEC RSTS operating system, but that didn't support remote printers, so Squibb had another problem with which to contend.

Finally it learned DEC was coming out with a bisynchronous printer supported by RSTS. However, Squibb's whole system was based on asynchronous transmission, so it persuaded DEC to make some asynchronous versions.

After an effort by Squibb to solve the lack of error correction capability on the lines to the printer, Codex Corp. came out with the solution: an intelligent multiplexer, the 6030. Prior to the Codex product, Squibb had developed a microprocessor-based device.

In 1974, there was no Cobol; there were no DEC VT52 CRTs, which Squibb wanted. After looking at terminals offered by different firms, Squibb opted for Infoton Corp. units. At the time, Infoton had its own maintenance force, but it no longer does. When Squibb changed its plan from a PDP-11/70 at each site to only five sites, DEC did not want to maintain its gear — printers that were in the satellite sites without CPUs, for instance. In addition, the purchase discount changed because of a fewer number of CPUs, Finch noted. So at one time Squibb didn't know what the total cost would be.

Inadequate Throughput

Software was a problem, too. Squibb got its applications done in time, but the throughput on the system for its order entry application was inadequate, she said.

Squibb had to wait a few months until DEC released Basic Plus-II. Squibb helped debug it and now gets the throughput it desires, with each order entry taking less than 1.5 min.

Despite the problems, the system is up and running, and it looks like it can be easily expanded.

The system's hardware cost about $2 million and its software about $1 million. About 20 man-years of effort went into the project, Finch noted.

Squibb's biggest oversight was its failure to realize that RSTS wasn't commercially oriented. It was too easily saturated by similar applications, such as the various procedures in data entry, with operators trying to get at the same files at once, she explained.

dc

Now...you can add 3 to 10 partitions in 5 byte-sized stages.

dc

BASIC I*
1 Batch Partition
2 Foreground Partitions
POWER-1™ Spooler

BASIC II*
2 Batch Partitions
2 Foreground Partitions
POWER-III™ (writer only) Spooler

STANDARD II*
All of BASIC II plus...
Full POWER-III Spooler
w/Job Entry Scheduler
3540 Support.
RJE (2770/2780/3780)

STANDARD IV*
All of STANDARD II plus
4 Batch Partitions
DOC/RS (system console support)
Resident Transient & Directory Support
SIM-370
Multiple Timer Support

STANDARD VIII*
All of STANDARD IV plus
8 Batch Partitions
Resident Access Method
DASD Space Management

DOS/RS™ Version 7 Series

No matter what product you need, expect the same results ... better throughput and improved job execution and device allocation.

Standard Features, All Products
• Program Relocatability w/Core-Image Library Compression • Partition Balancing

• Generic/Referral Device [illegible] • Automatic Volume Recognition [illegible] Startup at IPL • Procedure Library • [illegible] Performance Measurement • [illegible] • Mini-OBR • SVC Appendage [illegible] Processing • JCL Exits • [illegible] SYSRES Access Arm • [illegible] Partition • Support [illegible]

*VISAM—direct replacement for ISAM—optional on all products

dc dearborn computer company, inc.
dealer IBM computers
systems software
leasing

1460 renaissance drive/suite 400/park ridge, illinois 60068 (chicago) (312) 827-[illegible]
toronto (416) 621-7060 • st. louis (314) 727-7277 • houston (713) 965-[illegible] • dallas (214) [illegible]
member, CLA, ADAPSO, SIA, CDA

System Helps Keep Store Shelves Well-Stocked

NEW YORK — Korvettes, Inc., a large retailer headquartered here, is using a computerized distribution system to speed movement of incoming merchandise from warehouses to its stores in the area.

The system, written by Datamor, the company's DP subsidiary, has helped the company significantly shorten the time required to get merchandise where it is needed.

Korvettes' On Line Merchandise Management and Distribution (Kommand) was designed to facilitate the receiving, processing and distribution of materials, according to Datamor President Morton Weitz. "Management found it was losing two to seven days in the process of receiving and distributing merchandise from the warehouse and distribution center. It was agreed that we needed a system that would enable the warehouse to turn merchandise around quickly in its limited space," Weitz said.

"The system was also designed to eliminate paper handling steps, the main cause of our problem, as well as to ensure accuracy," he continued.

Korvettes uses an IBM 370/158 running under MVS with 5M bytes of memory. This system is linked via phone lines to IBM 3277 CRTs in the company's warehouses in New Jersey and Long Island. In addition, the system is linked to Four-Phase Systems, Inc. minicomputers, which print shipping labels and price tickets for the incoming merchandise.

"With 95% of Korvettes' soft goods and 80% of the store's hard goods routed through the Bayonne warehouse, distribution operations were one of management's greatest concerns," Weitz noted. The system was developed to ensure distribution "within our goal of 12 to 24 hours after all merchandise is received," he added.

Initial Functions

The system first comes into play when a buyer at the company's Manhattan headquarters generates a purchase order. The order is stored in the system until the shipment arrives at the warehouse, when the receiver can verify that it is correct and notify the home office of its arrival.

If the merchandise has been predistributed, it can be received, ticketed and distributed to the stores within three hours. Otherwise, the warehouse notifies the appropriate home office merchandising staff of the arrival, and the staff can then furnish the warehouse with instructions for distributing the goods.

This process eliminates the time lag that had been required when buyers were notified via hard copy.

In addition, Weitz noted, "the transcription of information and the possibility of error has been dramatically reduced."

Mike Berenson, senior vice-president and general manager of Datamor, added that the system has helped Korvettes "by improving home office and warehouse communications. By knowing when merchandise is scheduled to arrive at the warehouse, eliminating the search for purchase order documents and scheduling the carriers in an appointment routine, Korvettes is now able to move merchandise immediately."

Berenson added that the system could allow Korvettes to have the incoming merchandise delivered directly to individual stores if Korvettes wanted, but that centralizing the operation is cheaper for the company. In addition, the use of the computer gives the buying staff and management significantly greater control over buying and shipping of merchandise.

How has the system worked? "We are accomplishing our objectives while processing about 20% more merchandise through our existing warehouse structure," Weitz said.

Data/Switch
Puts YOU in Control

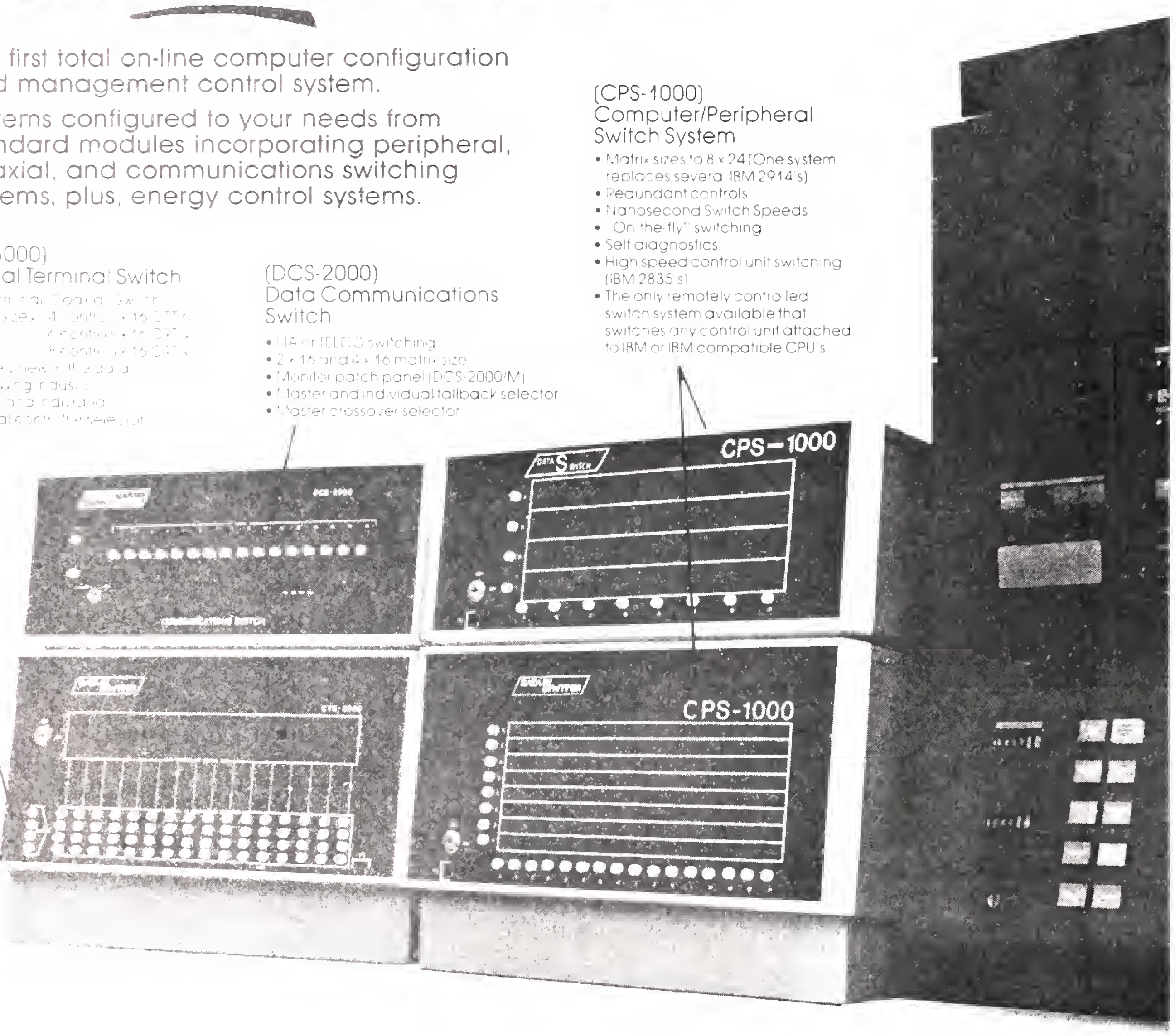
The first total on-line computer configuration and management control system.

Systems configured to your needs from standard modules incorporating peripheral, coaxial, and communications switching systems, plus, energy control systems.

(CPS-1000)
Computer/Peripheral
Switch System
- Matrix sizes to 8 x 24 (One system replaces several IBM 2914's)
- Redundant controls
- Nanosecond Switch Speeds
- "On-the-fly" switching
- Self diagnostics
- High speed control unit switching (IBM 2835's)
- The only remotely controlled switch system available that switches any control unit attached to IBM or IBM compatible CPU's

(CTS-3000)
Coaxial Terminal Switch
- CRT Terminal Coaxial Switch
- Matrix sizes: 4 controllers x 16 CRT's
  6 controllers x 16 CRT's
  8 controllers x 16 CRT's
- Unique - new in the data processing industry
- Master and individual terminal control selector

(DCS-2000)
Data Communications
Switch
- EIA or TELCO switching
- 2 x 16 and 4 x 16 matrix size
- Monitor patch panel (DCS-2000/M)
- Master and individual fallback selector
- Master crossover selector



Only Data/Switch Systems have all these features:
- State-of-the-art semi-conductor switching
- Solid state reliability and performance
- Redundant power
- Remote and extended controls
- Inter-active remote controls
- Continuous configuration display
- Key secured
- Compact size
- Modular design for on-line maintenance
- Flexibility for upward compatible growth
- Worldwide maintenance service
- Single source solution

DATA SWITCH CORPORATION

CORPORATE OFFICES:
LANDMARK SQUARE
NORWALK, CT 06851
(203) 853-3330

INTERNATIONAL DISTRIBUTORS:
FAR EAST,
NISSEI SANGYO COMPANY LTD
HITACHI ATAGO BUILDING
15-12 NISHI SHIMBASHI, 2 CHOME
MINATO KU, TOKYO, 105 JAPAN

EUROPE AND AFRICA
COMPUTER RESALE BROKERS INTERNATIONAL, LTD
QUEEN'S HOUSE, HOLLY ROAD
TWICKENHAM MIDDLESEX TW1 4EG ENGLAND

168
System available for short term sublease.
COMDISCO
312-698-3000

Hewlett-Packard
Computer Advances

Vol. 3 No. 6 Nov./Dec. 1978

Thin film technology: The HP 2621P printing terminal

Innovations in dot matrix printing

System 35 desktop computer

HP does it with dots

Hewlett-Packard has advanced the technology of dot matrix printing with a line of thermal and impact printing products that are both flexible and reliable, and offer good price/performance ratios.

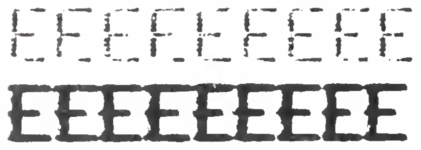
The flexibility to place dots in any arrangement means that multiple character sets can be developed—and graphics can be printed with high quality and accuracy. A matrix of dots can be used to describe virtually any character set or graphic display including: diagrams, subscripted and super-scripted print, graphs, charts, super-size print, labels (at any angle), and special decorative effects.

Hot dots

In thermal printing, characters in the form of dot matrices are inscribed on heat sensitive paper by energizing the resistors on a printhead. Inherent in this process, however, is the problem of overheating the resistors. When they become too hot, the letters smear.

To print the first dot, a resistor is heated with that amount of energy required to heat a completely cooled resistor. After the dot is printed, the resistor cools, for example, to approximately 75% of the original energy level. To print the next dot, the resistor is fired up again. It is now at 175% of the original energy level and getting hotter by the dot.

There can be problems in high speed thermal printing:



The HP2621P prints 2160 dots per second. Yet, by using a microprocessor to control resistor heating and cooling, print isn't light or smeared.

Uncontrolled, the process can continue and continue until the resistor eventually becomes so hot that the print begins to smear.

Hewlett-Packard's HP2621P thermal printing terminal meets this challenge with two innovations—controlled resistor energizing and efficient printhead cooling.

Controlled dot energizing

The HP2621P's microprocessor enables rigid control of the amount of energy given to a sequence of dots to ensure clear, crisp printing. After a dot is printed and the resistor cools, it is heated to a reduced energy level—just enough to print the next dot, not enough to smear it.

Specifically, we give the first dot of a sequence an extra amount of energy to allow full dot development. Subsequent dots are given only enough energy to maintain high-quality print.

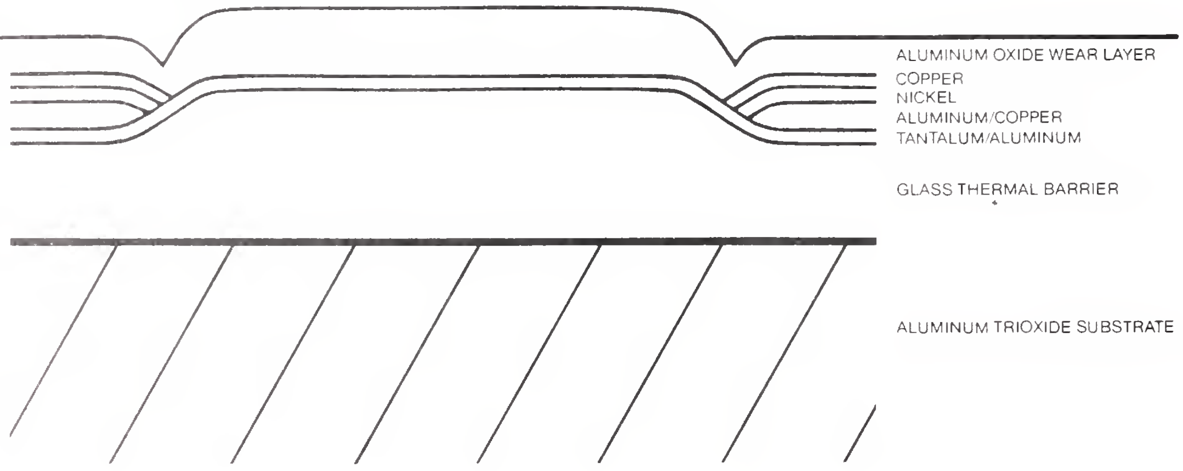
Cooling glass

Many years of experience in thin-film technology have helped us develop a printhead which ensures not only effective resistor heating but cooling as well.

The HP2621P printhead is composed of multiple layers of conductive and resistive materials applied to the printhead surface through an innovative magnetron sputtering system. In addition to these layers, there is a glass thermal barrier. The relationship between the resistive/conductive layers and the thermal barrier's thickness is crucial to heat

◀ Cover

The innovative thin film printhead of the HP2621 is shown greatly magnified on our cover, and here as a diagram (not drawn to scale). We have implemented an exceptionally thin glass thermal barrier to optimize heat transfer and enable clean, clear printing, even at speeds of 120 characters per second.



transfer. Too thick a barrier and the resistors are hard to heat. Too thin a barrier and too much heat escapes. The HP2621P utilizes an exceptionally thin glass barrier to promote the efficient heat transfer so essential for clear, high-speed printing.

Few moving parts

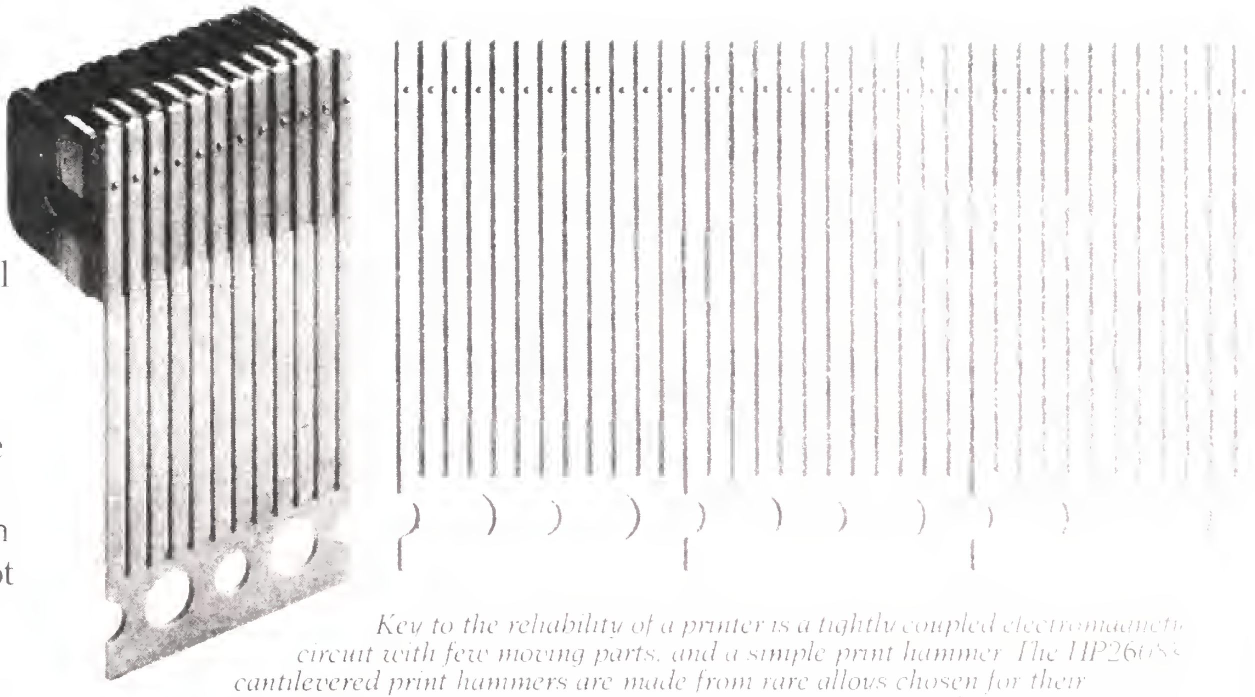
The HP2608 line printer is the result of a design challenge—to develop a highly reliable, medium speed line printer with precise dot positioning for graphics.

Typically, dot matrix printers have approximately 25% fewer parts than full-font character printers. The fewer moving parts a printer has, the greater its reliability. The high reliability of the HP2608 is achieved by a virtually frictionless print mechanism.

Ordinary printers rest the print bar on ball bearings and move it via stepper motors. The HP2608 has a mechanically balanced print bar on stainless steel springs or flexures. A voice coil linear motor moves the print bar back and forth.

The HP2608 has a virtually frictionless print mechanism.

An innovative concept in printers, this approach is drawn from well established technology in disc drives and audio speakers. The result—no rubbing parts. No ball bearings to wear out.



Key to the reliability of a printer is a tightly coupled electromagnetic circuit with few moving parts, and a simple print hammer. The HP2608's cantilevered print hammers are made from rare alloys chosen for their magnetic and stress qualities. For increased reliability, the print balls are securely soldered to the hammer using a proprietary HP microwelding technique.

Precision printing

To ensure high quality graphics, you need precision dot placement. The HP2608 has a cantilever beam print hammer and a drive coil for each of 132 character positions. During printing, each hammer is pulled back and released by an electromagnet. The hammer moves with a velocity defined by its resonant frequency.

To accurately position dots, all hammers must be driven at the same time. We use one drive pulse to guarantee simultaneous striking of all hammers. Printers which drive hammers individually have varied timing and dot placement.

Often, line printers produce characters and graphics that smear, ghost, or have light and missing areas caused by excessive vibration. We damp our hammers by placing a small, properly tuned spring behind each hammer and by using an electronic damping pulse. As a result, character ghosting and overstrikes are virtually eliminated.

Precision graphics require precision tooling. We maintain exceptionally tight mechanical tolerances on machined parts—tolerances usually found only on higher priced printers.

Specially selected alloys are used in the construction of the HP2608. Chosen for their magnetic and stress qualities, these metals give additional durability and reliability to the printer parts. Tungsten carbide, an extremely hard element often used for high speed cutting tools, is used for the head or ball of the hammer. The cantilevered print hammer beam itself is made from an alloy selected for its magnetic traits. HP uses an innovative micro-welding technique to bond these alloys together to form the hammer.

For more data on the HP2621 and HP2608, check A and B on the reply card.

The one-stop shop for terminals, printers, systems

HP2621

All too frequently low-cost character mode terminals mean a disappointing lack of capability. Not so with Hewlett-Packard's new interactive HP2621 terminals. These teleprinter-compatible terminals are designed for interactive computer applications such as data inquiry, computer-aided instruction, program preparation and development, data access and update, and general time-sharing.

The HP2621 terminals have many of the features found on the successful HP2640 terminal family. All offer refreshed raster scan technology, high resolution CRTs, the full 128 ASCII character set, off-screen storage, and built-in editing functions.

Instant hardcopy

Until now, getting a permanent record of your terminal activity was often expensive and inconvenient. Printers sometimes cost more than the terminals to which they are connected. In addition, if several terminals shared a printer, you may have had to wait for access to the printer and then walk to another area to pick up your print-out. Not any more. Since the HP2621P terminal has an integral, compact thermal printer, hardcopy is available where and when you want it.

There are advantages to integrating a printer and terminal. Both can share the same power source and the same housing. This reduces our costs—which keeps your price low. And thermal printers are quiet—suitable for a variety of work environments.

120 char/sec

The HP2621P prints fast—120 characters per second. It can print twenty-four full 80-character lines bi-directionally in less than 18 seconds. To do this, HP uses a smart carriage return—a known technique for increasing printer speed. In addition to printing from left-to-right or right-to-left, a microprocessor automatically computes the length and last character position of the next line of text, and then prints that line in the fastest, most efficient direction. A typical page of text prints in 10-12 seconds.

Reliability and high resolution

A potential cause of printer failure is the printhead/flex-circuit cable connection. Typically, printheads are attached to cables by wire bonds or metal clamps that tend to open up. Solder forms a more dependable, solid bond. On the HP2621P, the long-life printhead is soldered firmly to the cable and typically can withstand three pounds of 90 degrees vertical pull as well as a 10 pound tensile lift.

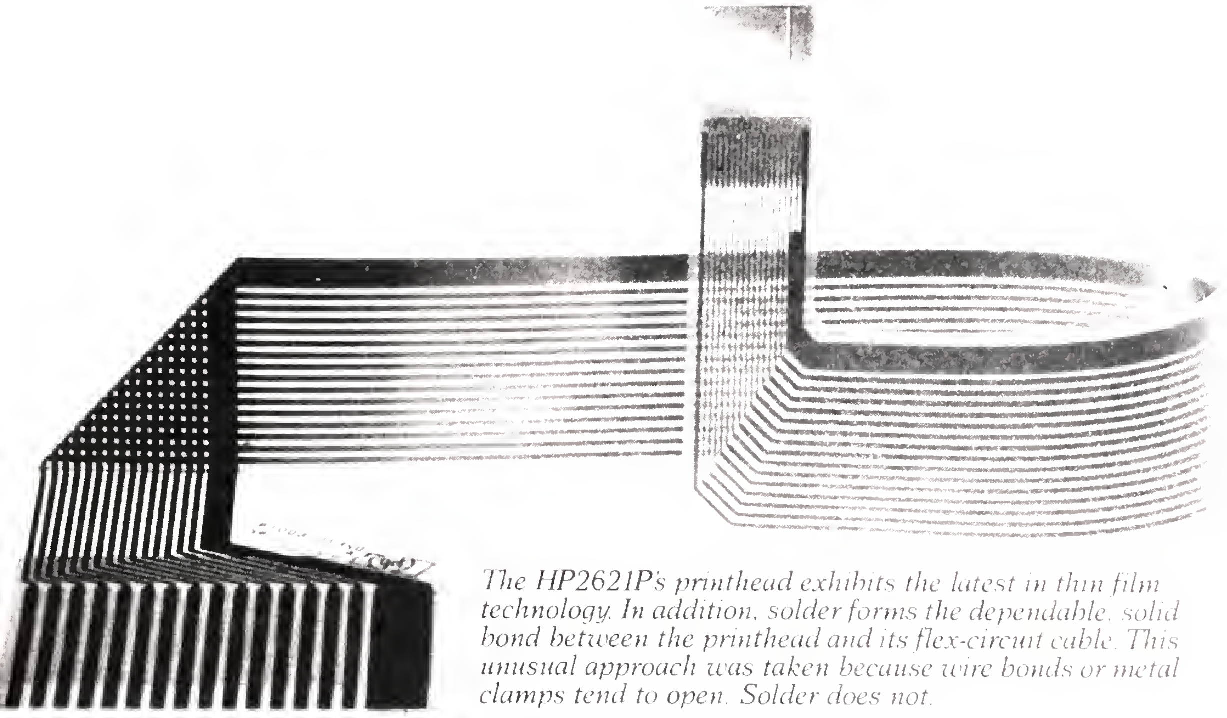
Both the HP2621A (no printer) and the HP2621P use high resolution CRTs of the same quality as our popular HP2640 family.

High resolution results from a 7 x 9 dot character matrix within a 9 x 15 dot character cell. In addition to better character definition, this 9 x 15 cell size provides for descenders on lower case letters and a character-by-character underline. Readability improves from wider spacing between characters and rows.

Two-page memory

The HP2621 terminals can store up to 48 lines (two full pages) in its 4K bytes of display memory. In

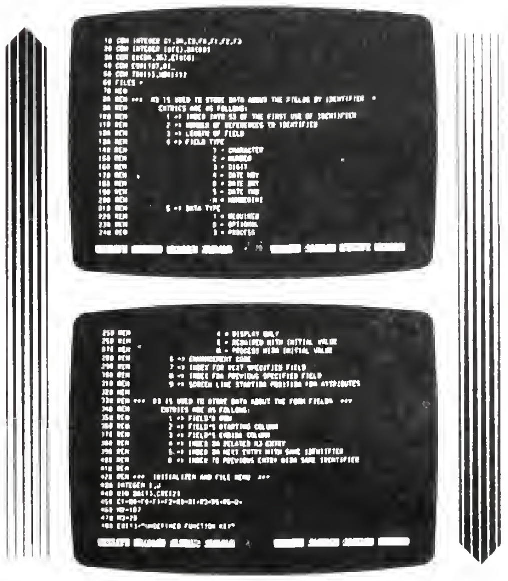
Seeing double? HP's low cost, character mode terminals, the HP2621A and the HP2621P, are nearly identical. The difference? The HP2621P has instant hardcopy.



The HP2621P's printhead exhibits the latest in thin film technology. In addition, solder forms the dependable, solid bond between the printhead and its flex-circuit cable. This unusual approach was taken because wire bonds or metal clamps tend to open. Solder does not.

text generation and program development, the ability to conveniently view 24 lines, either page-by-page, or by scrolling, line-by-line, can save time and reduce errors.

The HP2621 terminals add local editing to interactive applications.



Scroll up and down through a full two pages of memory with the new HP2621 terminals. This convenience saves programming time and reduces the potential for errors.

Neither requires software development or modification on most systems.

With line mode, each line of data from the keyboard is buffered for editing until the return key is pressed. Because these terminals can distinguish between data sent by the computer and keyboard entered data, operators can locally edit replies to computer generated questions. Only desired data is entered. In modify mode, any line in the terminal's 48-line memory can be edited and then retransmitted without retyping the entire line.

Interested in a low-cost data inquiry terminal for interactive applications? The HP2621A sells for $1450* while the HP2621P sells for $2550.* **For more details on the entire family of data terminals, check C on the reply card. Check A for the HP2621.**

Impact Printing

Hewlett-Packard recently introduced three new dot-matrix, impact printing peripherals: the HP2608 line printer, the HP2631G serial printer, and the HP2639 serial printing terminal. Because they use dot matrices, there is virtually no limit to the number of character sets that can be defined for the printers now or in the future. Among current offerings are character sets for most European languages, Arabic, Cyrillic, Katakana, and line drawing.

Reliable and convenient

The use of microprocessors in these new products means fewer electronic components and fewer high-priced mechanical parts. And that means greater reliability.

Plus, we put our impact printing products through rigid environmental and reliability verification tests (RVT). Randomly selected units from inventory are operated 24 hours a day, five days a week for the equivalent of one full year's average usage each. Results are documented in our RVT brochure. **If you want to see what punishment these products can take, check D and we'll send you a copy.**

Our new printing peripherals use a long-life, mobius loop ribbon cartridge. To change ribbons, just pop out the used cartridge and drop in a new one. No mess. No inky fingers.

HP2608

Designed as a medium speed line printer, the HP2608 is capable of printing over two million lines per month at a rate of 400 lines per minute. And, the HP2608 has graphics capability.

Precisely positioned dots are printed in a matrix form with a density of 5040 dots per square inch. Dots can be placed anywhere on a page within 0.03 mm accuracy. A 10 by 13 inch page can be printed in less than 20 seconds.

System flexibility

HP2608 line printers can be placed almost anywhere they are

Continued from page 5.

needed—up to 1000 feet from a connected CPU. For applications with extremely large output requirements, several HP2608s can be used in a multiple printer approach.

Rugged, yet quiet

Rugged enough for EDP applications, yet quiet enough for most office environments, the HP2608 provides noise reduction and ease-of-use features usually found only on more expensive printers.

The HP2608's stand is completely lined with sound absorbent foam with special deep recesses around the access cover to keep the noise sealed inside. An optional sound cover is also available.

The stand holds printer paper and has storage space for extra ribbon cartridges. A paper tray is positioned on the back of the stand to hold printer output.

Paper alignment is easy. You can move the paper up and down electronically with one dot row accuracy, using either the guide on top of the printer cover or the precision forms alignment guide inside the stand.

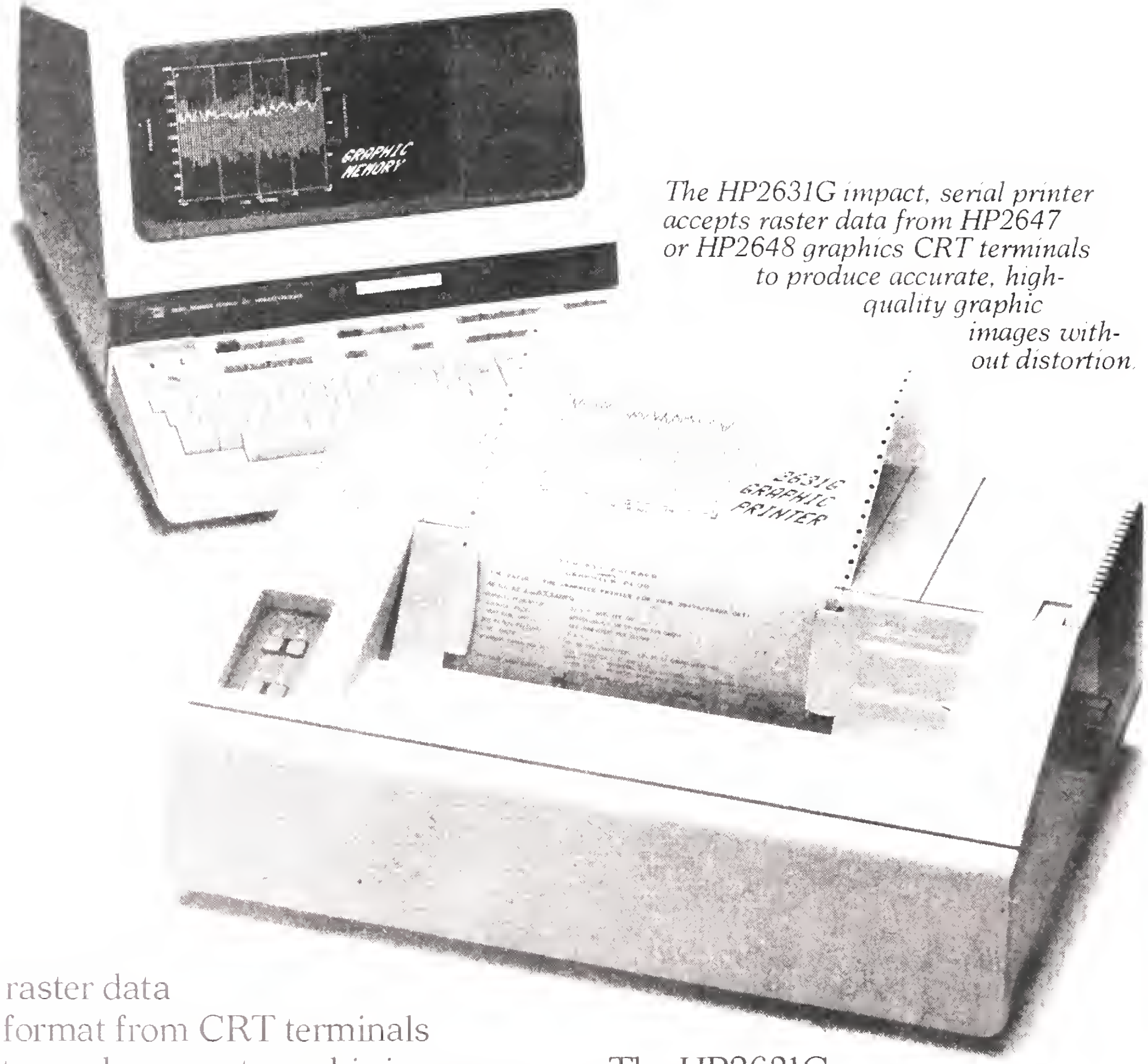
The HP2608 sells for $9250.* **For more information select B on the reply card.**

HP2631G

The new 180 characters per second HP2631G serial printer has all the features of the popular HP2631A—plus graphics.

The HP2631G accepts HP's raster data format from CRT terminals to produce exact graphic images without distortion. In less than 50 seconds, a typical 10 by 5 inch graph can be printed from the screen of an HP2647 or HP2648 graphics terminal. There's even an optional high density character set which nearly doubles the horizontal dot density—providing greater character clarity with only 50 percent loss in print speed. You can programmatically select four print sizes, line spacing, and page/text lengths. Also, an automatic perforation skip mode can direct the printer to advance automatically to the top of the next page when the printing reaches the bottom of the specified text length. Forms up to 255 lines can be handled.

Interested in a high quality serial printer with raster dump graphics?



The HP2631G impact, serial printer accepts raster data from HP2647 or HP2648 graphics CRT terminals to produce accurate, high-quality graphic images without distortion.

The HP2631G sells for $4250.* **For details, check E on the reply card.**

HP2639

The HP2639 interactive printing terminal can be used with a broad range of systems in a variety of applications, and is specifically manufactured for OEMs and end users of non-HP systems.

The HP2639 provides all the features of the HP2635 printing terminal as well as a flexible, asynchronous, serial interface. It sells for $4205* complete with keyboard. OEM discounts are available. **For more information, select F on the reply card.**

*U.S. prices only.

Minicomputer power; desktop convenience

Don't be deceived by appearances. Under the guise of a desktop computer, the System 35 gives you all the power of a minicomputer. Its high performance, 16-bit parallel CPU has typical instruction times of less than two microseconds. Yet, processor, keyboard, memory, mass storage, CRT and printer are integrated so compactly that they fit neatly on the top of your desk.

Large internal memory

The System 35 features a surprisingly large internal memory. Up to 256K bytes can manage an array of 30,000 numbers with 12-digit precision. A wide range of interface capabilities make the system ideal for data acquisition and controller applications. It is fully HP-IB compatible* and supports a wide range of peripherals.

Language power

The System 35's major contribution to desktop computing is a combination of complementary programming languages—BASIC and Assembly language.

BASIC is an interactive language that is both simple to learn and easy to use. The System 35 runs standard ANSI BASIC and is enhanced with sub-programs, numeric array instructions, and multicharacter identifiers—features normally associated with FORTRAN and APL.

An optional Assembly language capability optimizes program efficiency in terms of I/O and computation speeds. You can significantly decrease application program run times by isolating those segments of a BASIC program that are potential bottlenecks and coding them instead as an Assembly language sub-program. Certain specialized computations and I/O operations may actually be executed as much as 100 times faster in Assembly language.

Rapid Assembly

You can enter Assembly language source code through the keyboard as part of a BASIC program. Each line is checked syntactically the instant it is stored in memory. The ROM-based assembler performs at the rate of 1000 lines per second: turnaround is practically instantaneous.

The System 35 provides automatic editing capabilities which enable you to enter and edit your applications interactively. There is no need to call in special debugging or editing routines: they are inherent in the language and resident in memory. Or, you can write your own special function debugging programs.

Once your application is entered and edited, it can be reassembled in a matter of seconds.

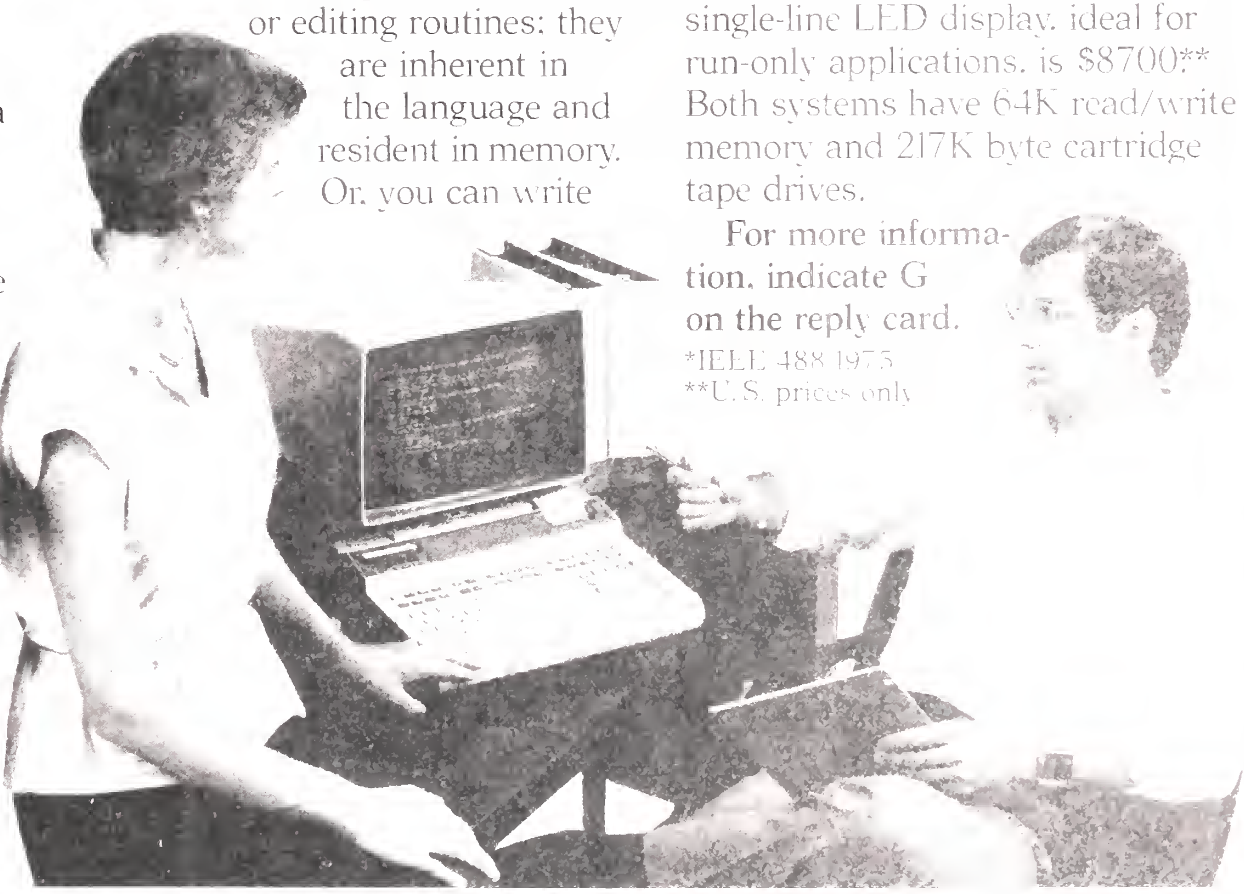
You can also interactively modify by single stepping through your Assembly programs. Each line of the original source code can be displayed for review. Variables can be examined and modified by name.

Compatible systems

The System 35 protects the software investment of HP9825 OEMs and end users who wish to add it to their existing systems. A translator is provided to convert HPL software to System 35 BASIC. In addition, BASIC is fully compatible with both the System 35 and 45.

The System 35A with CRT costs $9900** The System 35B with single-line LED display, ideal for run-only applications, is $8700** Both systems have 64K read/write memory and 217K byte cartridge tape drives.

For more information, indicate G on the reply card.



*IEEE 488-1975
**U.S. prices only

New & Noteworthy

On-line transaction processing system helps reduce inventories.

A manufacturer's on-hand inventory often represents substantial capital and carrying costs. But when material requirements are planned and controlled, inventory often can be reduced. Even a slight improvement in controlling inventory can have a major effect on profits.

Hewlett-Packard's materials planning and control system, MFG/3000, is ideal for manufacturers who produce multi-piece products in lots or batches. Utilizing the speed and power of an HP3000 Series II or III computer, MFG/3000 software can help to significantly reduce your manufacturing inventory.

MFG/3000 is three interrelated materials planning and control products. One stores bills of material, standard routings, and descriptive part data. Another keeps track of stockroom inventory as well as manufacturing and purchase orders; while the third suggests inventory procurements based on a customer's master production schedule.

With MFG/3000 you can avoid under or over-stocked conditions, recognize upcoming line stoppages due to material shortages, and meet your customer commitments with more certainty.

Proven results

Vydec, Inc., a user of MFG/3000 since January 1978, manufactures and markets floppy-disc-based word processing systems. While increasing sales and production by 100 per cent, Vydec has reduced its months-of-supply inventory by 30 per cent.

With MFG/3000, terminals are strategically situated so that as inventories change, data is immediately entered into and validated by the HP3000. Each department captures an up-to-the-minute snapshot of inventory status. And, as is necessary in many transaction processing environments, user interactions are designed to accommodate people with little or no computer or programming experience.

Vydec's materials manager, Marty Connolly, states, "Because MFG/3000 is an on-line system, we are able to reduce the time between receiving a market forecast and preparing its MRP to one or two days—versus about 14 days under the old system."

Quick implementation

MFG/3000 is a fully-developed, performance-tested package—complete with data base and flexible forms capabilities. No user programming is required for MFG/3000 implementation. And Hewlett-Packard provides the same high level of support commitment as for our HP3000 operating system.

Cutting implementation time and maintenance costs lets you direct your programming resources towards other needs within your company.

Know before you buy

Even before installation of an MFG/3000 system, we consult with customers to discuss their specific needs and the terminal throughput and response time they can expect based upon our documented transaction performance studies. Plus, customer training courses and implementation schedules are suggested.

John Doyle, plant manager for Vetter Corporation (a manufacturer of motorcycle fairings, and another MFG/3000 user), states "We knew what we were getting before we purchased. We felt confident we'd get full support from HP. We were right."

Each element of MFG/3000 sells for $5,000* with a monthly maintenance cost of $150.*

Interested in the cost savings of materials planning and control? **Check H for more information.**

*U. S. prices only.

Computer Advances is written to inform professionals of the latest technical contributions from Hewlett-Packard. You are invited to receive issues at your place of residence or business. Write Carol Scheifele, Computer Advances, Editor, Hewlett-Packard, 11000 Wolfe Rd., Cupertino, CA 95014.

HEWLETT hp PACKARD

Hewlett-Packard
Computer Advances
Direct Response Card

HP is pleased to provide you with literature or answer specific questions regarding any computer advances which intrigue you

Send more information | Please contact

☐ ☐ A. HP2621 terminals
☐ ☐ B. HP2608 line printer
☐ ☐ C. Data terminals' family
☐ ☐ D. RVT brochure for HP printers
☐ ☐ E. HP2631G printer
☐ ☐ F. HP2639 OEM printing terminal
☐ ☐ G. System 35
☐ ☐ H. Manufacturing/3000 systems

Name

Title Company

Address

City State or Province

Zip or Postal Code Country Telephone

Computerworld CW11-78

Hewlett-Packard
Computer Advances
Direct Response Card

HP is pleased to provide you with literature or answer specific questions regarding any computer advances which intrigue you

Send more information | Please contact

☐ ☐ A. HP2621 terminals
☐ ☐ B. HP2608 line printer
☐ ☐ C. Data terminals' family
☐ ☐ D. RVT brochure for HP printers
☐ ☐ E. HP2631G printer
☐ ☐ F. HP2639 OEM printing terminal
☐ ☐ G. System 35
☐ ☐ H. Manufacturing/3000 systems

Name

Title Company

Address

City State or Province

Zip or Postal Code Country Telephone

Computerworld

Business Reply Mail
No Postage necessary if mailed in the United States

First Class
Permit No. 141
Cupertino,
California

Postage will be paid by

Hewlett-Packard
11000 Wolfe Road
Cupertino, CA 95014

Attn: Computer Advances

Business Reply Mail
No Postage necessary if mailed in the United States

First Class
Permit No. 141
Cupertino,
California

Postage will be paid by

Hewlett-Packard
11000 Wolfe Road
Cupertino, CA 95014

Attn: Computer Advances

Project Management: A Formula for Success

Part 1

By John D. Toellner

How can you tune an entire organization for effective project management? This week the developer of a project management system suggests the changes needed on the corporate, DP and user levels, and next week he will address more specifics — estimating, performance standards, design freezes and implementation among them.

The cost of developing new systems is rising in every type of organization. Business is getting more complex, and the opportunities for developing more effective systems have improved with the advent of data bases, distributed processing and other technological advances.

Because of the coupling of this dollar value emphasis with an unattractive track record in the management of new systems development, the subject of project management is coming into critical focus for an increasing number of users.

Project management refers to the process that covers systems planning, priority setting, effective design, good visibilty on status and quality documentation. Effectiveness cannot occur in each of these areas unless the systems and programming group organizes so true project management can take place.

The press for change has been sparked by the existence of a series of common, serious problems:

- Projects are consistently completed late and cost more than estimated.
- Users are not satisfied with the final product.
- New systems do not adequately take advantage of new technologies.
- Documentation is inadequate in quantity and quality.
- Managers and users do not know where things stand.

The solution for these problems is not difficult to develop conceptually, but requires the implementation of some management tools and the restructuring of the organization. In developing a project management system and the structure to support it, the following needs should be served:

1. *We should involve management in a meaningful role.* This involvement should be concerned with items of scope, take a small amount of time, members of management to make a needed contribution and require them to use only standard business skills without becoming experts in data processing.

2. *Users should be deeply involved.* They must protect the interest of their departments in the development of new systems. They should be requested to do things where there is a real need and be assigned tasks they can handle. We should require only a small amount of their time.

3. *Guidance should be provided* to the next available staff member on what project he should work.

4. *Project work should be controlled closely* without encroaching on the professionalism of the staff members and should require a minimum of paper work and administrative time.

5. *The staff should receive clear guidance* on exactly what is required in each step of the project. A review process should examine the work developed at each step.

6. *Systems should be turned over to the operations and maintenance groups in a 100% documented condition,* and the documentation should stay that way when maintenance changes are made.

7. *Projects should be made to stay within budget and schedules* at each stage of the work.

8. *Excellent visibility should be maintained at all times* on where things stand and when future events should occur.

9. *The DP staff should get completely and firmly out of the priority-setting business.* It should place itself in an environment where it never has to say 'no' to a user.

The nature of project management causes natural separation between development and maintenance work. By maintenance work, I mean emergency maintenance, planned maintenance, modifications, enhancements and smaller projects.

Efficiency can be gained by segregating the development teams from the maintenance group. When an individual is given a mixture of tasks with one task having high-pressure deadlines and the others having less critical time requirements, the high-pressure task will always grow to absorb the majority of time. When maintenance and development activities are assigned to the same individual, the maintenance work will normally win, which is one of the reasons development projects consistently lag behind schedule.

Familiarization with individual systems is a key point for efficiently carrying off maintenance and small project work. This degree of familiarity is not so important for development because of the unique nature of each development effort. Often the development effort involves systems that do not exist within the organization or an excursion into new technology.

Because of this lessened need for application knowledge, greater flexibility exists for the assignment of development personnel to the next available project. Maintenance and smaller project personnel, however, are more efficiently kept within a particular application area.

When the groups are separate, it is then possible to prepare bar charts, or other visual displays, that show the time frame in which systems will be implemented. This is possible because of the knowledge of the size of each project and the number of development people, assuring that these resources will be available and not siphoned off to work on maintenance or other high-pressure activities.

In addition, separating the development teams and the maintenance and small project personnel also simplifies the priority-setting process.

Many systems and programming organizations are also divided into functional subgroups to directly support a group of user departments. This is a natural and desirable division because of the complex nature of some systems which may require extensive experience and an understanding of the user's business.

If these subgroups exist, I suggest that each of these functional divisions be further subdivided into development and into small project groups to obtain the benefits described earlier.

It is assumed that a project manager (or project leader) exists for each development team and that he reports to the head of a group. Frequently the entire small project and maintenance crew reports to a single supervisor or project manager.

Priority setting is a recommended process for both large and small projects. It permits the users and executive management to decide which work is most important to the organization.

The only work that is exempt is true

(Continued on In Depth 2)

(Continued from in Depth/1)

emergency requests. The authority to immediately execute emergency projects is normally delegated to the systems programming manager This is a satisfactory process as long as it is not abused.

For a development group, a recurring decision must be made. Tomorrow or next week or next month a development team will finish a project and be available for a new assignment. A decision is on which project the individuals will be assigned to tackle next.

Who makes that decision? Any project that is estimated at more than $20,000 or six man-months should be classified as development, in my opinion. With this type of price tag, it is large enough to deserve executive management's attention.

Establishment of a permanent management priority-setting group is recommended. The group should be composed of individuals at the vice-presidential or general manager level from each of the major operating departments which are frequent customers of systems and programming services. Such an executive-level group normally meets quarterly and sets the priorities on all project work, placing project proposals in rank sequence.

The group's efforts frequently result in a schedule displaying the next three to five years' work for the systems programming and development teams. The following year is considered to be firm, with subsequent years being more advisory in nature.

The plan and schedule is always kept up to date through quarterly meetings. This process of placing projects in rank sequence requires executive management to use only standard business skills.

Small Projects

Like the executive-level group for large projects, a decision must be made as to which new assignment a person will be given when a small project or maintenance programmer becomes available. Again, the only question remaining is who makes the decision.

I suggest the creation of a group called the Small Project Priority Committee (SPPC), comprised of manager-level people from the user departments which are the primary customers of modification and maintenance services. This group considers all work that will take fewer than six man-months or cost less than $20,000. The representation on this group should cover the spectrum of user departments.

If the small project and maintenance effort is divided into subgroups by application area, then one SPPC is needed to guide each group of analysts and programmers.

Before each SPPC meeting, individual department managers should rank all work requests within their own departments. The purpose of the SPPC meeting is to merge the work request list into a combined priority sequence to give user guidance to the analysts and programmers for their next assignment.

The SPPC normally meets monthly and sets priorities for the next three months. After each meeting, a simple bar chart schedule can be drawn to give visibility on these priorities.

With the implementation of the executive-level group and the SPPC, DP management is completely out of the priority-setting business. Because these two groups also consider the cost benefit desirability of requests for proposed work, DP is also out of the business of having to say "no" to a user when he requests work.

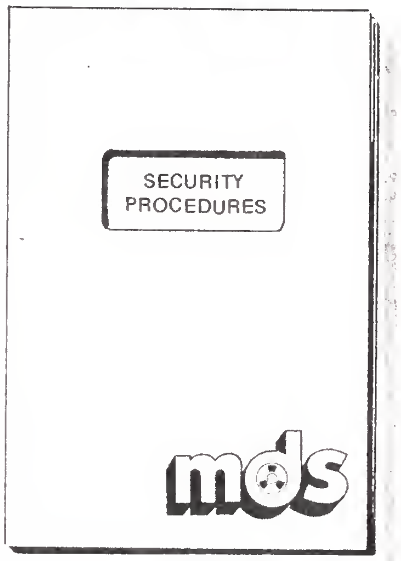
Service Functions

A series of service functions are necessary within systems and programming. To permit the project management process to run smoothly, each of these services is needed by members of the development or maintenance teams at some point in the project life cycle. These services are:

- *Project control administration.* Effective project management systems get many requests each week that require an answer. If no individual is present to give such an answer, then the project management process can get into serious trouble.

A full-time individual is needed for any group that contains more than 40 to 60 analysts and programmers. For smaller organizations, the project control administrator function can be combined with other duties, such as

Step #2: Defining the problem



Step #1
Automation security. It's a large problem in today's business world. And as in any problem solving situation, step #1 is recognizing that you indeed do have a problem The more we talked to D. P managers, operation supervisors, V. P's, and even presidents—people like yourself—the more we realized just how strongly you were aware of the need for *overall* security for your automation systems. And how there seemed to be nowhere you could turn for a total, comprehensive, A to Z automation security evaluation . . . tailored specifically for *your* installation.

You Can't Know Everything
Nor are you expected to. Management manages. Your job is to get the show on the road and make sure it stays there . . . running smoothly. You rely on professional help to get your job done, and done correctly You're not expected to do it all yourself.

And there in lies the rub!

Until now, you had a problem; overall automation security, and there was no one source for you to tap to get truly professional assistance. You had to use a portion of your valuable time deciding if your back up files are secure or wondering if a disgruntled employee could really get revenge through your system.

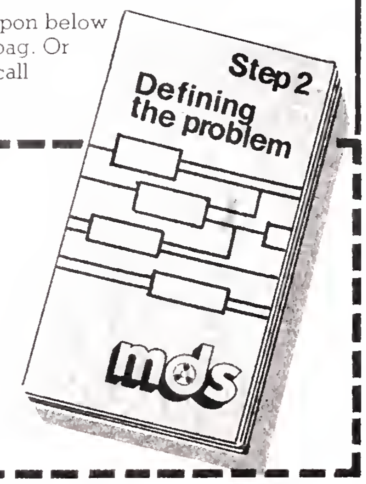
For Want of a Nail
Modernized, for want of let's say proper automation security, whole companies could literally go under It not only can happen . . . it has happened, does happen, to companies just like yours and to people just like you.

We're not trying to use scare tactics—we're being brutally candid. Because not having a secure system, being covered against eventualities that could put you in a down mode is sort of like playing Russian Roulette . . . it's just a matter of time, odds, and random chance.

The Stitch in Time Theory
Most likely, if you've read this far, you're aware that chances are you're not covered as you should be. And you see we're talking preventive knowledge. We don't sell hardware. Or software. Or guard dogs. Or window locks. Our product is expert professional preventive knowledge. When we're done with our in-depth survey you'll know not only where your weak points are, but more important, the most practical way to correct them. Preventive knowledge.

Step #2-A
Detailed definition of automation security, how and what we at M D S can do for you. Why you need to do it, and how we can help you get started on your way out of the frustrating maze of automation security. Step 2-A; a no-obligation booklet that will let you know, in detail, all about what we have to offer. And why.

Simply fill out the coupon below and put it in the mail bag. Or give Mr. Bill Morey a call at (703) 893-4820.



mds Management Data Systems
Division of Electronic Warfare Associates, Inc.
7926 Jones Branch Drive Suite 282 McLean, Va. 22102

Name ____________________
Company ____________________
Address ____________________
City __________ State ________ Zip ________

training. It is important that the other assignments given this person be of lesser urgency than the project control function.

• *Data base administration.* An individual is required to review data base matters as projects go through their life cycles. It is also assumed that the data base administrator maintains a central documentation on data elements and similar matters. This function is most effectively performed if it is centralized.

• *Security.* A central place for the audit of control features in newly designed systems and a place where one can get advice on control and security matters is highly desirable. The individual in charge of security should interface very closely with both the internal and external auditors.

• *Operations acceptance.* An individual should be assigned to assist in the systems test and the review of each operation's document to ensure that new systems that are turned over are complete in these regards.

• *Maintenance acceptance.* An individual should be designated to attest to the maintainability of new systems and to certify that a system has been adequately tested so severe maintenance problems will not be encountered.

• *Maintenance change control.* An individual should be given responsibility for examining the testing of JCL and programs and the updating of all required documentation in the operations, maintenance and user areas each time a change is made to the system.

The Master Systems Plan

The systems a company creates are a direct reflection of the business it is in and the role its executive management sees for DP in supporting the business. Without some type of effective plan, the systems development effort lacks emphasis. Whatever development work that does take place tends to be ad hoc, meeting the greatest current pressures brought by individual managers.

In this environment, unserved users often attempt to go outside the company to get their work done. This causes additional aggravation for DP management if standards are to be enforced to ensure effective systems development and to ensure that essential interfaces with existing systems or with future systems are proposed.

The lack of a plan also results in many changes in priorities, with resulting shifts in individual assignments. This normally proves quite wasteful of the systems and programming resources.

When plans are developed, they are often created in a place too distant from the end user and become the DP plan for the organization. But there is an approach that will result in a corporate plan for DP.

From the Top Down

In the development of a plan, the ideal approach is to build on a foundation of the corporate goals and objectives. In many organizations, unfortunately, these goals and objectives have not been clearly and formally spelled out, and it is often necessary to make assumptions regarding the direction in which the organization is headed.

It is also desirable to identify and document DP goals and objectives that support the corporate goals. A long-range strategy for carrying out the company's business can then be developed.

Once the strategy has been developed it is possible to catalog business functions and to create broad "blueprints" of each application area which identify each major system and the interrelationship of the various systems in that area. If these blueprints are prepared in flow-chart form, each major system would be shown as a single block on the chart, and connectors would identify the relationship between the systems.

This approach can be called a "top-down" plan because it starts with the management objectives, goes to systems and programming objectives, next to systems blueprints by application, and then to the identification of individual systems. It is assumed that a proposal is subsequently prepared for projects to create each of the needed systems.

This development process is similar to the IBM Business Systems Plan. A number of reputable consulting firms

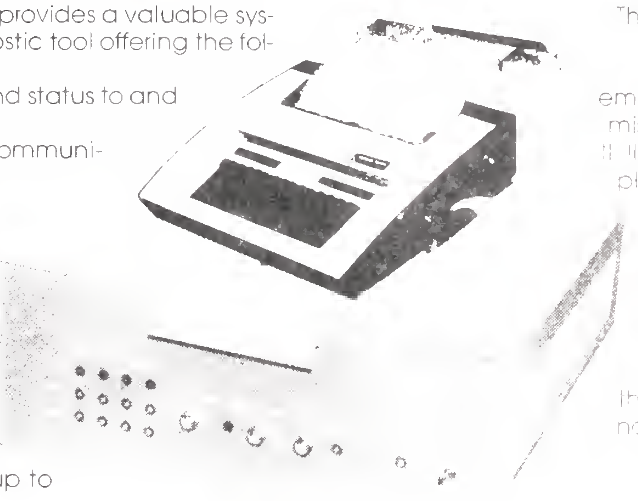
(Continued on In Depth 4)

COMMUNICATIONS MICRO CONTROLLER

OPERATOR CONSOLE

The CMC operator console provides a valuable system monitoring and diagnostic tool offering the following functions:
- Trace commands, data and status to and from the host computer.
- Trace data to and from a communication line.
- Selectively allow or inhibit classes of trace information.
- Allow data tracing to be initiated on specific "LOCK ON" characteristics for transmit and receive data to and from the communication lines.

The console can be any teletype compatible terminal operating at bit rates up to 9600 BPS.



The CMC is a high performance micro-processor directed controller that emulates the IBM 2701 transmission control unit for IBM I, II, III, TTY and SDA II line disciplines. It occupies less than 1.3 cubic feet of space and can replace up to two IBM 3704's or IBM 2701's at a fraction of their combined cost. EIA RS 232-C and wideband interfaces offer high throughput in an extraordinary reliable and compact package.

NO OTHER TCU IN THIS PRICE RANGE OFFERS AN OPERATOR CONSOLE!

DPF Incorporated, a Fortune 500 company, is one of the largest independent computer leasing corporations in the United States. Through its computer leasing operation, DPF services a broad range of leading organizations, institutions and governmental agencies. It owns and/or manages a computer portfolio with an original manufacturers price approaching one-half billion dollars.

Southwestern Region
Mike Tansey
(713) 688-5232

Eastern Region
Clement DeSimone
(914) 428-5000

Midwestern Region
Bruce Thompson
(312) 843-1800

Western Region
Bill McDermott
(415) 941-4354

Southeastern Region
Tom Little
(404) 934-9610

INTERESTED?

For further information, call or mail the coupon to:
DPF Compatibles/Dept. CC
DPF Incorporated
141 Central Park Avenue South
Hartsdale, New York 10530
(914) 428-5000

Specifically, my application requirement is

Name
Company
Title Phone ( )
Street Address
City, State, Zip

(Continued from In Depth/3)

have also been using this approach to develop long-range DP plans.

Unfortunately, the process consumes substantial amounts of calendar time and is quite expensive. Largely as a consequence of this and the lack of expertise in this area, very few organizations have a plan in existence or a process to create one or to keep one up to date.

Bottom-Up Plan

To get a plan established in a shorter period of time and to buy time for development of a top-down approach, the bottom-up plan is a real help. This approach starts with a survey of project managers and senior analysts in DP to identify systems that are needed to ease the maintenance or operating problem that exists. The DP staff members are often aware where strong user pressure exists for new or modified systems.

A preliminary list of needed systems prepared by DP should be taken to key user personnel to certify that the systems are actually needed and to solicit requests for additional systems. The next step is the division of listed systems into multiple pieces or combinations of systems that cover the most incremental scope. Most organizations can develop lists of 20 to 50 systems names by this process.

For such a list, it is desirable to identify the order of magnitude of the required project to create each of the systems. It is suggested that terms such as "massive," "very large," "large," "medium" and "small" be used to identify the level of effort required, rather than trying to attach dollar amounts.

When this is done, any candidate systems that will obviously cost less than $20,000 or six man-months' worth of systems and programming effort can be segregated. It is suggested that this smaller project work be handled in conjunction with the organization's maintenance and enhancement work.

Project Proposals

With either a top-down or bottom-up approach, the plan is not complete until each project has been investigated, the cost and benefits have been identified and a management judgment has been made about the wisdom of using the organization's resources to create each system. The document that captures the data is called a project proposal.

In addition to describing the desired system, this document displays the benefits (both tangible and intangible) the system's requestor expects and a broad estimate of cost.

The estimate is arrived at by considering the scope of the proposed work and comparing it with cost records of prior projects. To improve the accuracy of the estimating process, it is wise to have it performed by a small group of experienced DP persons rather than a single individual.

Proposal preparation normally takes one to three man-weeks, but it can take as long as three months. The key task is conducting broad interviews with users on their requirements. This assignment is one of the most difficult for systems analysts to perform because they have been trained to quickly concentrate on comprehensive detail; conducting interviews for only broad functions becomes a challenge. It is significant that design activities not be performed at this highly preliminary level.

Other major tasks required to produce a proposal are the review of the proposal draft with user management to ensure both its accuracy and their support when it is presented to the management group. User management may then request any needed revisions.

Assembling the Master Plan

Once a series of proposals for each project is complete (six is a desirable number), the priority-setting process can begin.

Although DP management has been doing this by default for years, it should get out of the priority-setting business. The responsibility for this function rightfully belongs in executive management's hands.

Executive management would like to make these decisions if it can be assured it does not have to acquire a substantial technical knowledge of DP to do so. However, as I have already shown, the task can be performed using only conventional business skills.

It is difficult to assign priorities in an absolute manner. Often many of the projects appear to be of equal importance. An easier process that produces a more practical result is to rank the project proposals.

A prerequisite of this process is that each of the proposals be screened by some responsible management person to ensure that the benefits described are sufficient to justify the roughly estimated cost. Once the cost benefit screening is complete, then the ranking process can begin.

The ranking procedure is most easily performed if it takes place in two stages. Stage I results in the proposals being cast into four groups: (1) essential, (2) high priority, (3) low priority and (4) to be done later. A category of average priorities is purposely not chosen because it tends to be a slop bucket in which proposals are placed when decisions cannot be made.

The differentiation between high and low priorities forces the members of the management group to clarify their feelings about the individual projects. During the initial priority-setting meeting, the casting of the proposals into the four groups can be done quite rapidly.

Stage II combines new proposals with the existing priority list. Once a tentative ranking is accomplished, then the simple exercise of comparing two proposals at a time has proven workable.

For example, suppose there were only enough money to fund one more project — which of two proposed projects would it be? By starting with the two proposals at the top of the list, the rank sequence can be confirmed or altered. By proceeding through the list, pair by pair, it is a simple and practical matter to place all of the project proposals in rank order.

It has been my experience that the top two categories (essential and high priority) will account for at least a two-year workload for the entire systems and programming staff. It is essential that top management set priorities only on this quantity of projects because a series of additional priority-setting meetings will be held over the two-year period to reassess thinking on the project sequences.

Because the project sizes are in excess of $20,000, it is recommended that the executive management level group be used for the priority setting. It is necessary for it to meet only quarterly to confirm the sequence of projects previously ranked and merge new project proposals that may have been developed since the last meeting.

Master Plan Schedule

If the level of resources (people in systems and programming for development work) is known or can be assumed, then a milestone schedule can be developed to let the management and users know where each requested system stands. In the identification of the resource level, it is assumed that the individuals working on small projects and maintenance are not included.

A simple milestone schedule is drawn by considering the dollars per month that the project team can accomplish compared to the estimated dollars on the project proposal. No detailed scheduling or work assignments are considered in this broad level of schedule development.

It is also possible to prepare more than one schedule based on different assumed levels of resources in systems and programming. For example, one schedule can be drawn on the assumption that the department will have 30 analysts and programmers available and a second plan can be developed showing the resulting schedule if there were 40 people on the staff.

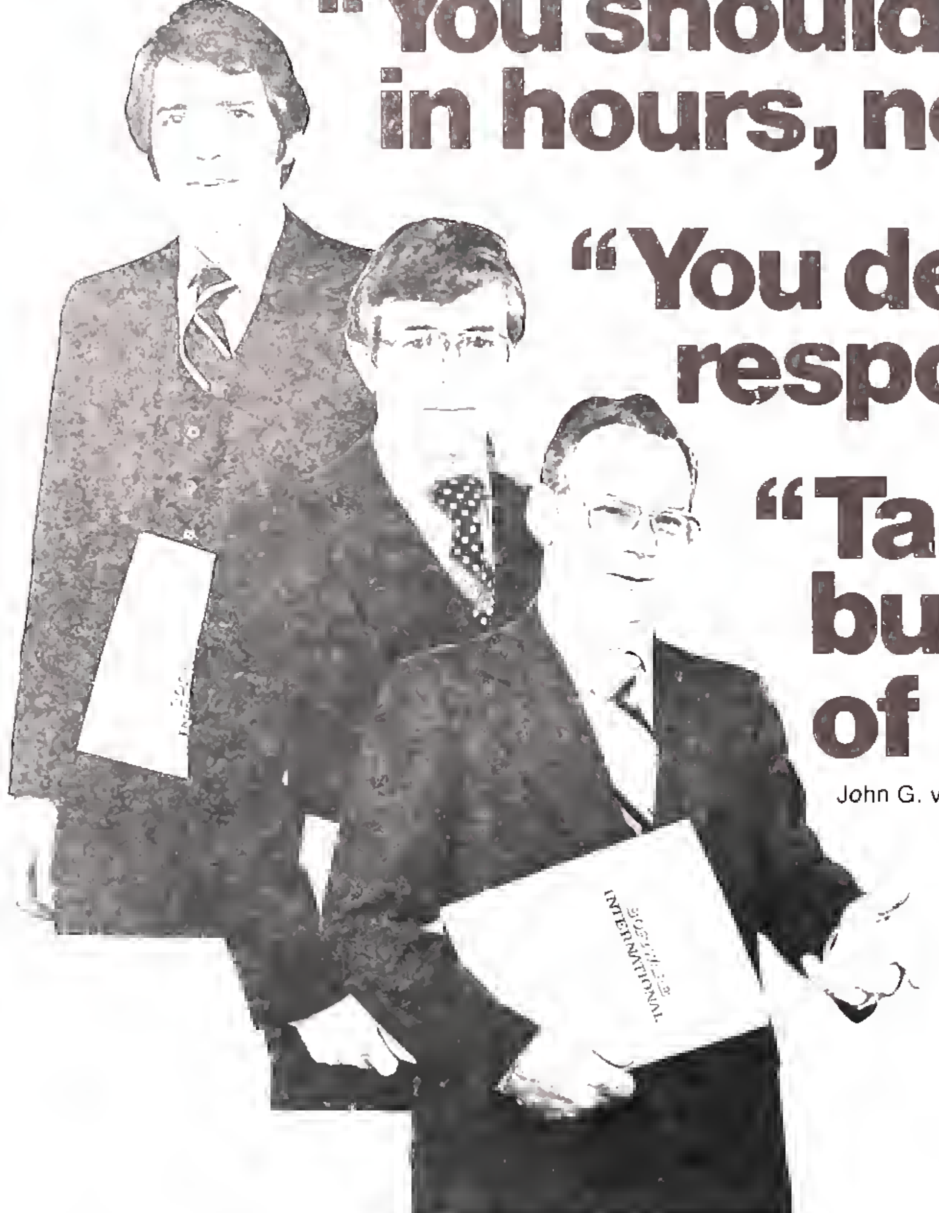
After the schedule is produced, it is healthy to review the priorities with the management group, making sure the group is comfortable with the time frame for the development of the systems. Often they will reconsider the resource level of the staff in systems and programming in order to shorten the schedule or will agree to farm out work to accelerate the implementation of the needed systems.

Three-Ring Binder

The development of a master systems plan is most conveniently done using a three-ring binder or its equivalent. In the assembly of such a plan, the author considers the following table for contents to be a minimum:

- Background and purpose.

(Continued on In Depth/6)



"You should be al to close the books in hours, not we s!" Timothy J. Conroy, Corporate Vice President of Technical Services, Software International Corporation

"You deserv ast, competent response." Ro E. Nickerson, Technical Manager, Eastern & International Divisions, Software International Corporation

"Take ad ntage of real-world busines xperience regardless of your op's size or computer!" John G. von Jess, Senior Vice Presiden are International Corporation

More han software... results!

General Ledger and Financial Reporting • Fixed Asset Accounting
Accounts Receivable • Accounts Payable • Net Change
Manufacturing Resource Planning • Payroll

Software International's first priority has always been to satisfy user needs.

Because our systems give users what they need, more than 1500 corporations around the world rely on Software International. Large and small organizations have proven that we offer the most cost-effective, reliable and easy-to-use financial and manufacturing control systems available.

Yet it takes more than good software for successful implementation. We support *all* of our products with a world-wide network of local offices, staffed with professionals whose wide range of expertise covers both data processing and business. Users benefit from this support with *training, technical support, comprehensive documentation, maintenance and regular enhancements*.

It all adds up to more than just software. We deliver satisfied users. Call or write today and get *more* than the best application systems.

Please send me your free literature about the FINANCIAL REPORTING SYSTEMS: CW1127

LARGE COMPUTER SYSTEMS —
for users of IBM, BURROUGHS, DEC, HONEYWELL, UNIVAC and ICL computers.
Financial
☐ General Ledger
☐ Payroll
☐ Accounts Payable
☐ Accounts Receivable
☐ Fixed Asset Accounting
Manufacturing
☐ Material Requirements Planning
☐ Master Production Scheduling
☐ Capacity Planning
☐ Shop Floor Control
☐ Purchasing

Comprehensive Report Generator
☐ FILETAB
SMALL COMPUTER SYSTEMS —
for users of System/3 and other IBM, Burroughs, Univac 9030, Honeywell 62, HP 3000, DEC, Interdata and most popular business minicomputers.
☐ General Ledger
☐ Payroll
☐ Accounts Payable
☐ Accounts Receivable
☐ Fixed Asset Accounting

Name ____ Title ____
Company ____
Address ____
City ____ State ____ Zip ____
Computer System ____
Phone ____

SOFTWARE INTERNATIONAL.
Elm Square, Andover, Mass. 01810 (617) 475-5040
Atlanta (404) 252-9880 • New York (914) 332-0040 • Washington, D.C. (301) 770-4460
Chicago (312) 298-3500 • San Diego (714) 292-9631 • Toronto (416) 862-0521
Houston (713) 444-3048 • Columbus, OH (614) 773-2167 • San Francisco (415) 433-5197

(Continued from In Depth 5)

- Goals and objectives
- Assumptions.
- Statement of strategy
- Blueprints by application area.
- Priority lists.
- Schedules
- Individual project proposals.

It is recommended that the master systems plan start with the bottom-up version and list only the last few sections. As progress is made on the top-down version, materials can be added to the other sections as they are developed.

To make the plan an integral part of the project management effort, a key policy is mandatory. This policy states that the only way to acquire development funds within the organization is for a requestor to have a project proposal prepared and succeed in getting the proposal ranked as Priority No. 1. When this policy is enforced, then the long-range planning and priority setting process becomes a permanent and viable part of the project management process.

Without the policy, there springs up by-pass routes for project funding which permits the "squeaky wheel" to get his project work done without taking his request to the priority group. In this environment, the entire priority-setting process can rapidly deteriorate.

Life Cycle Components

In this article I assume the project manager is taking responsibility for the total project. By the total project, I mean all of the user activities that occur in advance of data entry, all of the DP activities and all of the user activities that occur subsequent to the DP function.

When a project life cycle is built under this assumption, it will normally contain substantially more things to do than if we look upon systems only as existing a few inches to the left or right of the computer.

Each architect of a project life cycle normally chooses the term "phases" and will define two to 15 phases. It has been my practice to refer to only three broad phases as a vehicle to communicate the nature of the work being done as the project progresses through its life cycle.

Phase One is systems definition, where preliminary activities take place to understand what the user requires and to decide upon the broad approach to be pursued in the design of the system. Phase Two covers the design and development activity, and Phase Three is concerned with systems implementation.

An important principle in the assembling of a life cycle is that *all* project work must be defined by a task at the correct point. A second principle is that the life cycle should avoid "looping" or cycling back to redo tasks. It should flow from beginning to end.

In each of the three phases, there are certain tasks associated with the design and development of the system. In Phase One, the project must be organized, review boards set up, detailed user requirements documented, conceptual design developed and an evaluation performed to choose the most appropriate direction.

During Phase Two, a large number of the tasks are associated with defining inputs, outputs, data base activities, system specifications, controls, program design, program specifications, programming and unit testing. During Phase Three, the production of user manuals, training materials, systems tests and similar items are handled.

Administration and Control

The second category of things to do on a project is made up of the administration and control activities. In Phase One there are planning activities to assign and schedule tasks, as well as a series of quality controls at milestone points where a logical amount of work has been done. A re-funding activity should take place at the end of this important phase which involves estimating, scheduling and securing management approval.

In Phase Two, quality control is needed at the end of preliminary design, detail design, program design and unit testing, replanning and recertification of the viability of the systems design from the user's as well as the technical viewpoint. Also, special reviews by the data base administrator, the security specialist and the internal auditors must be built in.

During implementation, the planning of the implementation, the review of

Why settle for ordinary flexible discs when you could have Memorex® Markette® flexible discs?

There are some significant differences between most flexible discs and Memorex Markette flexible discs. Differences that make ours significantly better.

We completely manufacture our discs, enabling us to give complete attention to product quality and reliability.

We test every track completely before we certify our discs 100% error-free.

We make a complete line of flexible discs—six families with 22 standard products, including our new double density Markette 2d and 5-1/4" Mini-Markette.

And our Markette brand flexible discs are completely compatible with every major system in the market.

Compare the specs. Compare the prices. And you'll see there's just no comparison. See your Memorex distributor or phone toll free (800) 538-8028. In California, call collect (408) 987-2410.

Or write to us at
1200 Memorex Drive,
Santa Clara, CA 95052.

Memorex Markette. Because you won't settle for just any flexible disc.

MEMOREX
Computer Media Products

the user manual and quality reviews by maintenance and operations representatives are essential.

The third category of tasks in a life cycle is documentation. Much documentation is a by-product of other activities, but additional tasks are necessary to accomplish the unique documentation that will end up in the operations and maintenance areas.

All of the documentation produced in Phase One is for the purpose of getting the design appproach clarified and is normally not maintained after the project is over. Much of the documentation produced in Phase Two becomes a part of the maintainable documentation at the end of the project. In Phase Three, a series of additional tasks are required to bring about the documentation that satisfies the total needs of the end user, the computer operations group and the maintenance activity.

The project life cycle also becomes an ideal vehicle for the training activities of the department. The life cycle clearly displays all of the task work to be performed at each phase of the project.

By comparing the capabilities of each individual with the tasks to be performed in the life cycle, the identification of specific gaps in training is most easily accomplished. Once the gaps are identified, then the selection of appropriate training courses can be made so that the staff becomes qualified to execute the tasks for which it is responsible.

The life cycle can be considered analogous to a clothesline that has on it a series of garments: one for each design, development, administrative and documentation task. The garments are arranged in the sequence of task execution. This arrangement has the further advantage that as systems development or project management techniques change, it is necessary only to take down the out-of-date garments and to put up the new ones.

It is important that the tasks in the life cycle call for only the work that is needed so a project following the tasks will do only the work deemed necessary by the DP management group.

The standard life cycle is assumed to be the starting point for each individual project. When the project manager plans his project, he starts with the standard, prepared life cycle, eliminates the tasks that do not apply and adds the tasks unique to his assignment.

Support Materials

If all projects were the same size, a single life cycle would be all that would be required. However, projects occur in all sizes from maintenance jobs to massive development efforts.

It has been my experience that settling on three life cycles is impractical. The first life cycle contains extensive control checklists for the maintenance function, which might apply to any project less than one man-month.

For projects that fall in the one to six man-months category, a small project life cycle containing a reduced number of tasks is appropriate, and the full life cycle would be used for all projects larger than six man-months. The complete life cycle is developed first and the other two derived from it.

An additional challenge is to produce guidance materials for the staff. If detailed guidance material is produced for each task, it can be considered threatening by senior members of the staff, who might feel that that much hand-holding is not required. For them, summary descriptions of what to do and what to produce are all that is required. However, for intermediate and junior staff, more specific guidance is usually appreciated.

Forms-Oriented Documentation

In constructing these support materials, suggest that no task be included in a life cycle unless it can be so described that it produces specific deliverables. The reason for this is that it becomes administratively simpler to define the end of the task as being the production of all the stated deliverables.

Further, the reviewing process is simplified if preprinted checklists of the needed deliverables are made available to both the reviewers and the people doing the work.

The deliverables most conveniently take the form of documentation. In my experience, form-oriented documentation is a desirable route to follow. The reasons for this are

(Continued on In Depth 8)

FROM THE ARCTIC
TO THE RIO GRANDE

WE
GET
OUR
MAN

DATA-MAN

The File Management and Data Retrieval System with six years and 200 users in Canada and Europe. Now available to the United States through **Dataman Corporation** in Dallas, Texas.

Dataman Corporation.
P.O. BOX 1928
PLANO, TEXAS, U.S.A. 75074
TELEPHONE (214) 596-7337

Dataman Ltd.
#700 816 SEVENTH AVENUE S.W.
CALGARY ALBERTA, CANADA T2P 1A1
TELEPHONE (403) 266-4638

(Continued from In Depth 7)

- The assigner of work can most clearly communicate to those who perform the work what he is asking for if he can give them a brief description of what to do and identify specific forms to be completed.
- It is faster to document information on forms than to start with a blank piece of paper, prepare the rows and columns and then document the data.
- Unnecessary documentation can be eliminated because rules can be set to stipulate that only the official forms are used.
- Essential information can be guaranteed if the department requires that all mandatory forms be complete.
- It is highly helpful to the persons performing the maintenance function if the documentation they use always appears in the same format.

Each task needs a standard that describes what to do and what documentation to produce. This material need not be wordy because the life cycle is responsible only for controlling the sequence and format of the deliverables. Including teaching materials in the standard makes the materials bulky and difficult to use on a day-to-day basis. An example of a well-executed deliverable is highly desirable because it quickly communicates the level of detail being requested.

A standardized documentation repository for each of the projects in the department should be created. The repository should contain a series of preprinted tab dividers that identify all the specific deliverables produced on the project. All documentation produced is placed behind the appropriate divider.

The project manager (or any other manager) can quickly determine where the project stands by examining the contents of the repository. Where the repository stands is where the project stands. This simple concept has proved to be extremely useful.

When an audit of the conformance to the standards is performed, the mechanics of the comparison is very straightforward because the repository and the standards manuals use the same dividers. In summary, a project life cycle needs the following characteristics:

- All tasks to be performed must be included: design, development, administrative, control and documentation.
- Each task must produce deliverables; forms orientation provides benefits.
- Three life cycles are needed: large, small and maintenance.
- Detailed guidance material is essential.

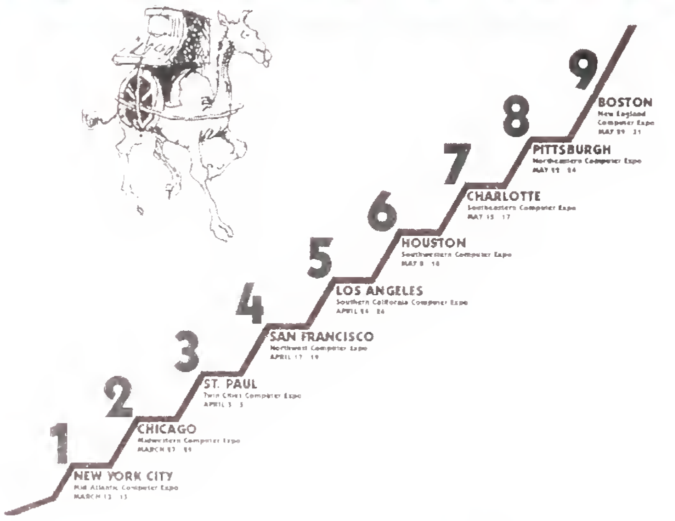
The life cycle becomes the foundation for all other project activities such as estimating, planning, technical efficiency, user involvement and operations turnover.

John D. Toellner is president of Spectrum International, Inc., formerly known as J. Toellner & Associates, the developer and marketer of the Spectrum project development system.

Toellner has 27 years of industrial experience; the last 15 years have been spent in DP-related consulting.

The author holds a B.S. in mechanical engineering from the University of California at Berkeley and did two years of graduate study in operations research and computers.

9 STEPS TO PROFITS!



Join the Nationwide Tour of Computer Expos!

The most profitable companies in the EDP industry are regular exhibitors at the Caravan's Computer Expo's. Join the industry leaders at the 1979 Computer Expo's!

Strong Local Penetration

Every "national" show is really a big local event. The Caravan is a series of highly successful local shows. Because you choose the markets you want to appear in, you control marketing penetration. You can join the Caravan in one or any number of cities.

More than 50,000 Qualified Decision Makers will come to the Caravan

The Caravan offers an unhurried, relaxed atmosphere for both buyer and seller.

EDP Trends Briefings — A New Way to get Your Message to the Marketplace

New at the Caravan's Computer Expo's is a unique series of forums called EDP TRENDS BRIEFINGS. Your best prospects will be able to examine a variety of key-issues which involve your products and services. Your buyers will be informed, and in a much better position to buy right. To sell right, you'd better be a part of the Caravan. (Your competition probably already is.) Call or send in the coupon right away. And think how great next year's profit picture will look!

I'm sold . . . send me an application right away.
I'm interested in
FULL 9-CITY TOUR
INDIVIDUAL CITIES (Please list)
Send me literature only.

name
title
company
address
city
state
zip
phone

COMPUTER EXPO '79

The Conference Company
60 Austin Street, Newton, Mass. 02160
(617) 964-4550
WEST COAST SALES OFFICE: (213) 474-2585

CW1127

*Survey available upon request.

Computerworld Special Report

a new world of choices

data communications networks

November 27, 1978

Edited by Ronald A. Frank

Independent of Host's Architecture

Dutch Bank to Start Up X.25-Based Private Net

By Leo P. van der Toorn
Special to CW

AMSTELVEEN, Netherlands — One of the world's first private X.25-based networks will come into service in the Netherlands at the end of this year. It was designed by Philips Teleprocessing to meet specifications formulated by the Amsterdam-Rotterdam Bank N.V. (Amro).

The high-speed packet-swtiching network utilizes Comsys, a flexible approach to independent hardware/software packaging based on the Philips DS-714 Mark III switching system. Both batch information and interactive inquiry/response traffic will be accommodated by the network, which is expected to handle a daily load of more than one million messages by 1982.

The recording and exchange of information are obviously fundamental to the banking business, and the importance of these functions increases as more stress is placed on diversity of domestic and international services.

The demand for up-to-date management information at all levels continues to rise steadily, as does the volume of information interchange with clearing houses, organizations such as Swift and so on.

In the Amro case, the automation of payment traffic activities in widely dispersed offices throughout the country led in the early 1970s to the creation of office service centers at which customers' transfer orders are collected and the information input via data entry equipment, to a main DP center in Amstelveen, near Amsterdam, where virtually all processing is done.

In order to cope with projected increases in this type of traffic, to meet data communications needs associated with other activities and to provide the infrastructure for future applications, the bank elected two years ago to install a full-service private data network.

Special Significance

Apart from a number of special features, some of which are discussed below, the network has a rather special significance because it is an example of a major DP user installing a large data communications network which is entirely independent of the host system architecture.

Comsys uses procedures and protocols which conform to internationally accepted CCITT standards and are compatible with virtually any configuration of host and terminal facilities. The network is therefore open-ended and can grow and change as new terminal equipment is developed and as public data networks evolve.

Technological developments in hardware or software can be applied to the network structure as they become available, without influence on the DP

(Continued on Page S/15)

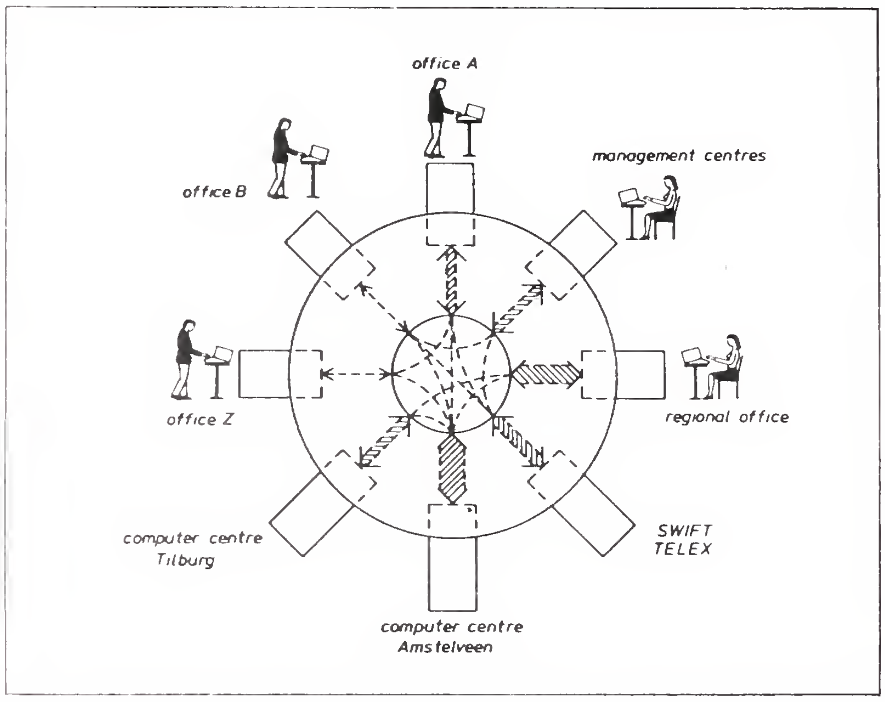


Figure 1. Data flows between sources and systems in the Amro banking network.

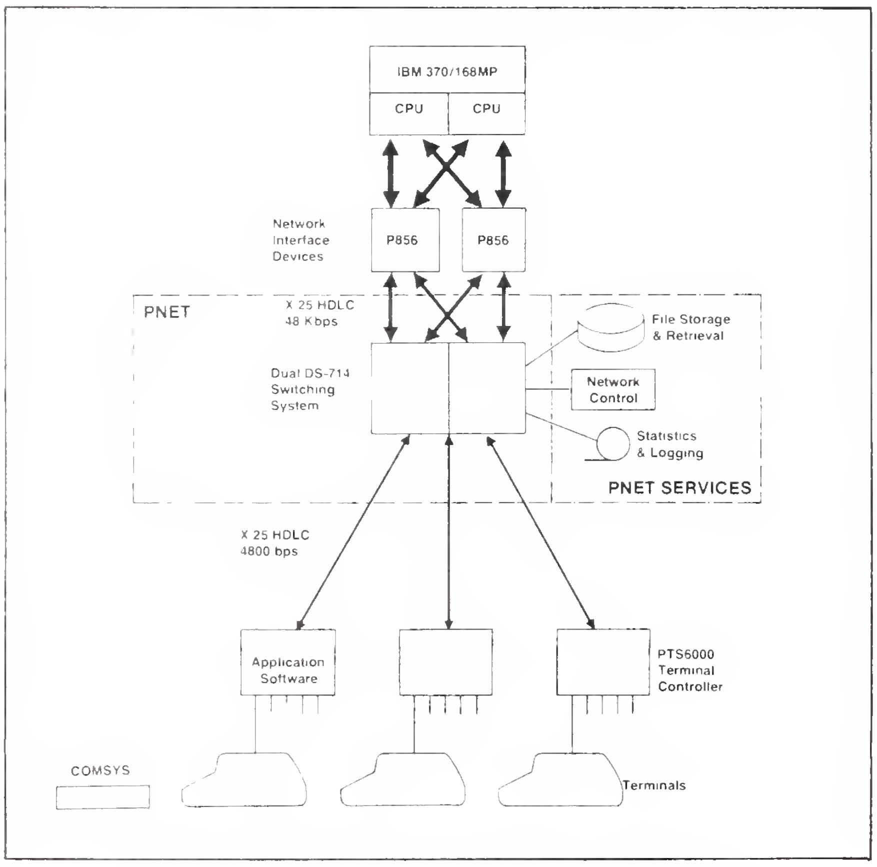


Figure 2. General Arrangement of the Amro Network

Packet-Switched Network Designed for APL Users

By Roger D. Moore
Special to CW

The I.P. Sharp Associates Ltd. (IPSA) APL network began operation in the summer of 1969 with a system that contained one time-division multiplexer (TDM) and 60 dial ports. By early 1976, this had grown into a medium-sized collection of TDMs, including one transatlantic link. During 1976 and 1977 this network was replaced by a packet-switched network.

The primary goal of the network, both before and after the change, has been the provision of APL service to remote low-speed terminals.

The network is not particularly obvious to the user. Initial connection is kept as simple as possible. With a single input, the user can identify both terminal type and destination APL machine. If the requested APL facility is available, user interaction with the network ends.

After the connection has been established, the network acts as a simple forwarding agent: output from APL is passed to the terminal for printing and input from the keyboard is passed to APL.

Unlike certain public networks, this net has no provision for escape to the network during a session. The closest approach to this is the network recognition of XON/XOFF when the terminal is not in the "input to APL" mode. These control characters allow the terminal to control the rate at which output is sent from APL to the terminal.

The network requires a certain amount of information about the user's terminal for terminal control and for printing legible error messages. The APL/360 trick of examining the initial right parenthesis to resolve BCD vs. Correspondence has been retained. This character was chosen on the grounds that many people would accidentally type it during a sign-on attempt and the information required by the network would be acquired.

The initial right parenthesis from an Ascii terminal is not actually used by the network. It is retained breifly so that an obfuscatory blot can be elicited from APL after a connection has been

(Continued on Page S/20)

On the Inside

Dutch Bank to Start Up X.25-Based Private Net S/2
Packet-Switched Network Designed for APL Users S/2
Net Helps French Bank Grow Easily S/3
Users Cautious, But Many Will Go SNA Route S/4
Network Allows 150 Universities to Share DP-Based Resources S/6
Net Helps Chrysler Dealers Accelerate Vehicle Repair Process S/10
Service Reduces U.S.- UK Transmission Costs S/12
Integrated Network Helps Firm to Yearly Savings of $600,000 . . . . S/19
Firm Cuts CRT Response Time Via Satellite Link S/30
Management Entering Age of Master Planning S/33

Net Helps French Bank Grow Easily

By Kathi Bylander
Special to CW

PARIS — A dispersed data communications network is a vital part of the daily operations of Societe Generale, a prominent French bank headquartered here.

By early 1971, Societe Generale had a teleprocessing system encompassing 700 terminals that served the provincial branches and were linked to the central mainframes by a single line.

Despite the quality and extent of the services rendered, however, the system was unable to satisfy the requirements of a bank with 2,600 branches, 35,000 employees and four million accounts throughout France.

Societe Generale had two main DP centers at that time — one near Paris and the other in Aix-en-Provence, just north of Marseilles — and all input from the branches came to these two centers each working night.

After the processing was performed, the reports and other documents were returned to the branches before 8 a.m. via trains, buses, delivery people on motor bikes and so on.

Needs Assessed

In 1972, the bank began studying what the next generation of DP system should be. Transaction volume was growing rapidly and it was clear that the existing system would be operating near capacity by 1978. In fact, it was projected that by 1980, transaction volume would reach 100 transactions per second.

Bank management called in SG2, its computer consulting subsidiary, to redesign the old system. SG2 formed a team of engineers and programmers and went to work.

By 1973, bank management agreed that Societe Generale should aim for a distributed system; by the fall of 1975, it had begun testing.

Two group processors and 50 terminals, plus testing equipment, were installed. Conversion of the first test group and four branches began in October 1975 and was completed about five weeks later. The result was a limited version of the type of operation described here.

Previously, files were account-oriented. If a customer had several accounts, the files had one record for each account. But in the new system, data is customer-oriented. All accounts for the same customer are linked together for on-line query and sequential batch processing.

In all, a three-year schedule was laid out for converting branches and regions to the new system. It is planned that all nodes of the distributed system will be in operation by 1980.

Societe Generale expects that its distributed system will grow with the workload, adjusting to increases in transaction volume and allowing flexibility for opening new branches and regions.

Administrative Core Retained

The teleprocessing system designed by SG2 retained Societe Generale's ex-

(Continued on Page S/28)

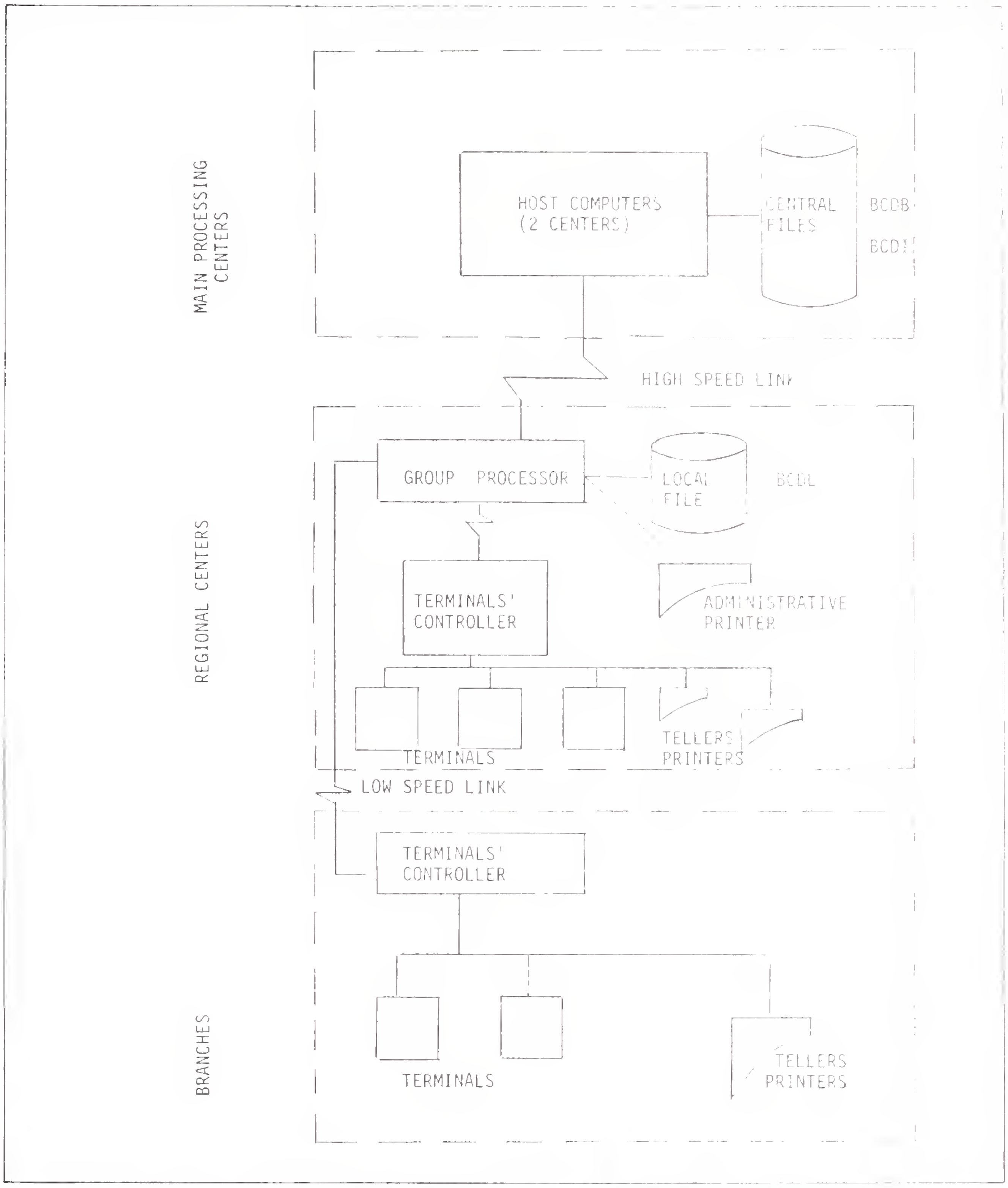
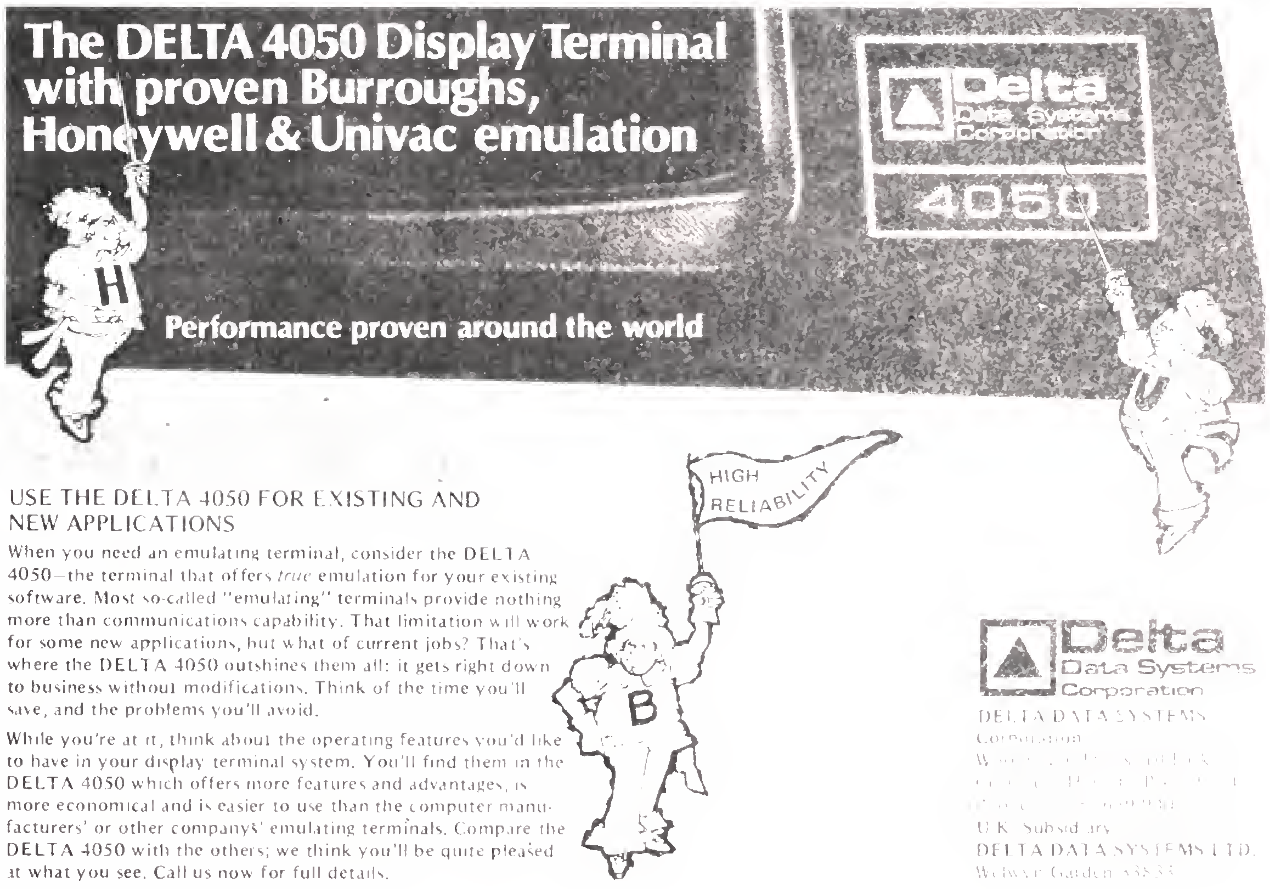


Figure 1. Network (RTA) Scheme of Societe Generale



The DELTA 4050 Display Terminal with proven Burroughs, Honeywell & Univac emulation
Performance proven around the world
Delta Data Systems Corporation
4050
H
HIGH RELIABILITY
B

USE THE DELTA 4050 FOR EXISTING AND NEW APPLICATIONS

When you need an emulating terminal, consider the DELTA 4050—the terminal that offers *true* emulation for your existing software. Most so-called "emulating" terminals provide nothing more than communications capability. That limitation will work for some new applications, but what of current jobs? That's where the DELTA 4050 outshines them all: it gets right down to business without modifications. Think of the time you'll save, and the problems you'll avoid.

While you're at it, think about the operating features you'd like to have in your display terminal system. You'll find them in the DELTA 4050 which offers more features and advantages, is more economical and is easier to use than the computer manufacturers' or other companys' emulating terminals. Compare the DELTA 4050 with the others; we think you'll be quite pleased at what you see. Call us now for full details.

Delta Data Systems Corporation
DELTA DATA SYSTEMS
Corporation
[illegible]
[illegible]
[illegible]
U.K. Subsidiary
DELTA DATA SYSTEMS LTD.
Welwyn Garden [illegible]

Users Cautious, But Many Will Go SNA Route

By John Gantz
Special to CW

WALTHAM, Mass. — Four years ago, IBM pulled together some then-new terminal offerings and a new, barely understood line protocol called Synchronous Data Link Control (SDLC) and announced its Systems Network Architecture (SNA). It thus loosed a cascade of networking acronyms for IBM and other computer and communications vendors that is still inundating the user

Prior to SNA IBM s offerings in data communications were a hodgepodge of incompatible hardware and software products In the decade before SNA, IBM had developed more than 200 communications products, 35 teleprocessing access methods in the host and 15 line protocols.

SNA is IBM s attempt to impose coherence on that tangle, to straighten the compatibility snarls.

Slow in Short Range

But the proposed beneficiaries of the SNA blueprint — the users — have been slow to wed their short-range plans, at least, with IBM's. SNA does not come cheaply, and it requires a commitment to IBM products and philosophy. For the last several years, it has seemed that the marriage of users to SNA has been a troubled one.

Because of a lack of orderly industry statistics on SNA — rumors were rampant that SNA was a total flop — International Data Corp.s (IDC) *Distributed Processing Newsletter* recently conducted a survey of IBM users to ascertain their plans regarding SNA.

Is SNA a flop? Well, it hasn't been an overnight success. Perhaps IBM didn't intend it to be. The concept itself is intricate and difficult to assimilate and implementation can be complex.

SNA development has been evolutionary — one building block at a time — and a critical mass of SNA hardware and software products probably has not been reached yet. SNA also has some drawbacks:

- System processing overhead can be costly. One public utility saw the number of transactions/sec on its 370/158 Model 3 drop by three to 11.1 under OS/VS1/Vtam over DOS/EXTM.
- Memory overhead can be excessive. A small SNA network with SDLC and the Virtual Telecommunications Access Method Vtam can easily eat up 1M byte of virtual memory and 200K- to 300K bytes of real memory.
- SDLC's seven-frames-in-transit protocol can increase the efficient use of communications lines, but imbalances between inbound and outbound traffic can reduce that efficiency.
- Training for operations and programming staff requires significant outlays and follow-on salary increases.

According to the users, SNA's major weakness is in its software, with Vtam the especial bugaboo — some described it as unstable. Another problem was that IBM salesmen and field service force weren t checked out on SNA in the beginning.

Users Speak

The IDC survey touched base with 241 IBM installations, more large users than small. In all, the sample represented 3% of the IBM 370s and 370/50s or 65s (6% by value of systems installed). More than 15% of the 370/168s and 8% of the 370/158s were accounted for.

The respondents reported more than 50,000 terminals in their networks as of December 1977 and said they would have 70,000 by December 1979. About 30% of those were IBM 3270s.

The questions asked of the users included system configuration as of December 1977 and that expected by December 1979, amount of SDLC use, experience with SNA and evaluation of SNA. Some of the basic findings were:

- Forty out of 241 sites were SNA users, 17 had 370/168s or 165s as the senior system on hand and 14 had 370/158s or 155s.
- Forty-eight more said they would be SNA sites by December 1979: 17 with 370/168 or 165 senior systems, 25 with 370/158 or 155 senior systems. Forty-six more said they would switch to SNA in the "foreseeable future."
- The most popular justification for implementation was better network throughput, but better hardware performance and savings in communications costs were also frequently mentioned.
- The most prevalent reason for rejecting SNA was lack of proven savings. Almost one-third said it required too much memory. One-fifth of the respondents didn't want Vtam.
- Of the 50,000 terminals represented, 4% currently had SDLC. By December 1979, the SDLC percentage will be 16% according to the survey (See Figure 1).

Comments from users in the survey revealed a wary "what's-in-it-for-me" attitude. Those who have switched to the IBM blueprint have done so for the performance improvements more than the cost savings; those who haven't aren't going to move off the dime until the economics are there.

Polishing the Lure

But IBM is changing the equation of those economics.

First, the Armonk mainframer is lowering the entrance requirements to SNA. Early on, the company an-

(Continued on Page S/8)

SNA Applications	Number of Mentions For Current	Number For Future
Inquiry Response	16	21
Sales Order Entry	11	11
Inventory Control	9	12
36XX Applications	7	7

SNA Expectations	Yes	No	No Reply
Did SNA Meet Them?	22	7	11
	(55%)	(17%)	(28%) (Too early to tell)

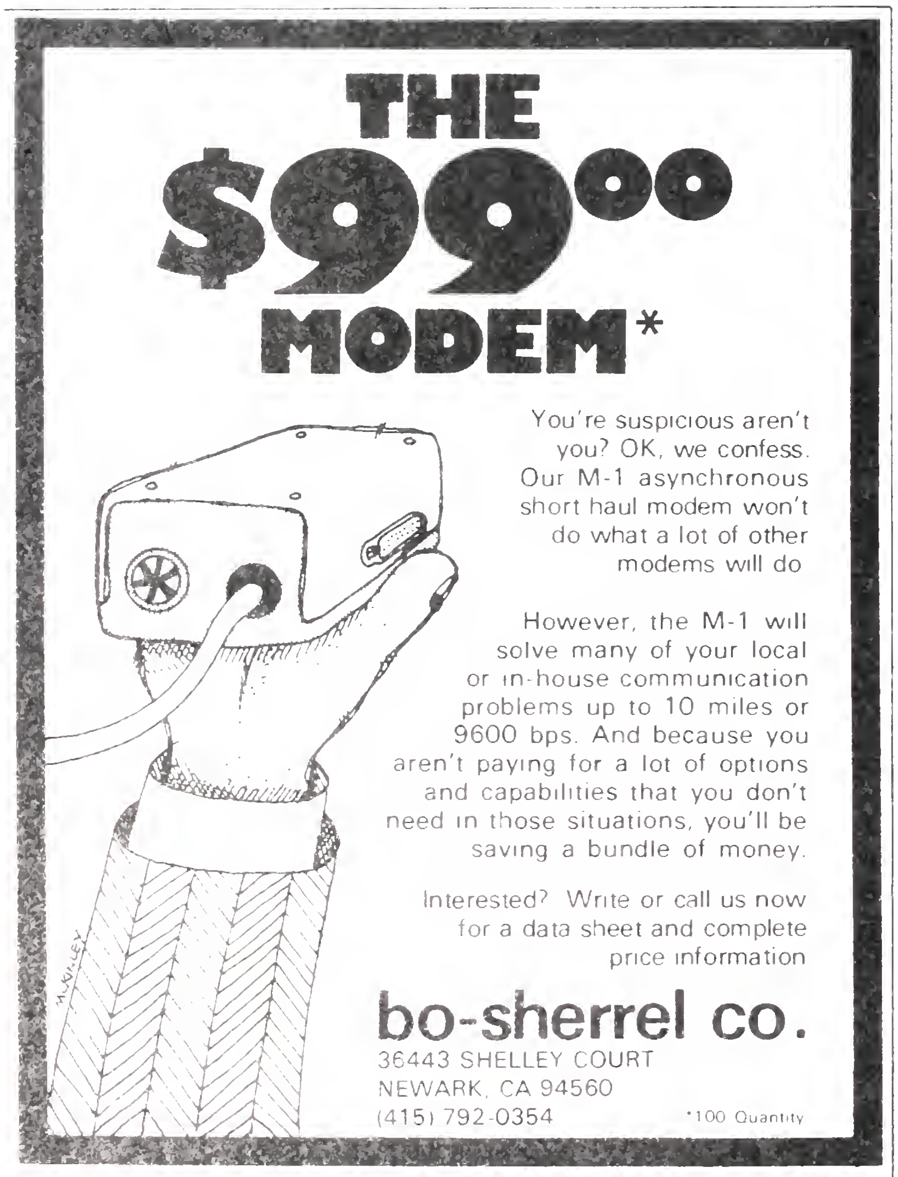
Conversion Problems

	None	Training	Hardware	Software
Number of Mentions	8	14	12	18
Percent of Mentions	15%	27%	23%	35%

Reasons for Migration	Number of Mentions	Percent Of Mentions
Better network throughput	26	41%
Better prices/newer hardware	22	35%
New applications/easy to go SNA	8	12%
New applications/SNA worked best	7	12%

Reasons for Rejection	Number Of Mentions	Percent Of Mentions
No Proven Savings	62	21%
Memory Overhead	52	18%
Vtam	39	14%
SNA Hardware	27	9%
Stick With Bisynch	25	9%
MVS	21	7%
IBM Marketing Practices	19	7%
Want PCM terminals	16	5%
Don't want central network	14	5%
Don't understand it	14	5%
TOTAL MENTIONS (172 responding sites)	291	100%

Figure 1. User Responses



THE $99.00 MODEM*

You're suspicious aren't you? OK, we confess. Our M-1 asynchronous short haul modem won't do what a lot of other modems will do

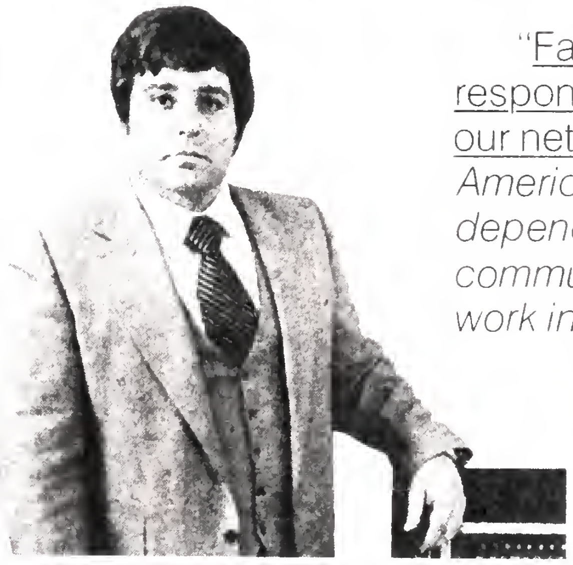
However, the M-1 will solve many of your local or in-house communication problems up to 10 miles or 9600 bps. And because you aren't paying for a lot of options and capabilities that you don't need in those situations, you'll be saving a bundle of money.

Interested? Write or call us now for a data sheet and complete price information

bo-sherrel co.
36443 SHELLEY COURT
NEWARK, CA 94560
(415) 792-0354

*100 Quantity

20 SECONDS TO 5 SECONDS.



"Faster CRT response times made our network better." American Fabrics depends on its data communications network in providing fast response to customers.

Sixteen CRTs in Los Angeles linked to the firm's Newton, Mass. headquarters via satellite handle some 15,000 transactions each day, according to MIS Director Maurice G. Parent. But as traffic increased, so did mainframe polling requirements. Terminal response times suffered.

A Paradyne PIX II "Virtual" Data Link made American Fabrics' network better by eliminating mainframe polling. Response times dropped from 20 seconds to five seconds on the satellite link because CRTs in Los Angeles transmit only data to the mainframe — not ACKs and NAKs.

"SDLC doubled our transmission rate." Parent said easy implementation of SDLC via Paradyne's PIX II also made his network better, by providing simultaneous two-way transmission and improving response times for remote printers.

"We were up and running within hours and have no maintenance problems, because PIX II — not the mainframe — controls all data communications functions between remote devices and the mainframe."

Paradyne is making networks better for organizations around the world. Organizations like American Fabrics, and like yours.

PARADYNE. BETTER

NETWORKS NOW.

Modems, Analysis Network Control Systems, PIX II "Virtual" Data Links
Paradyne Corporation, 8550 Ulmerton Road, Largo, Florida 33540, (813) 536-4771

Network Permits 150 Universities to Share

By Paul S. Heller

Special to CW

PRINCETON, N.J. — Edunet is a national service network established to facilitate the sharing of computer-based resources among institutions of higher education and research [CW, Nov. 28, 1977].

Operated as a special activity of Educom, a nonprofit organization located here, Edunet provides services that permit the large community of users to identify and apply specialized resources to meet their diverse DP needs in instruction and research.

Individuals on user campuses work with members of the Edunet central staff to access one or more of the host CPUs at 15 educational institutions that serve as Edunet suppliers. The connection between the user terminal and the host CPU is generally provided by a value-added communications network such as the packet-switched service offered by Telenet Communications Corp.

A facilitating network, a relatively new concept, differs from most networks in that the net itself does not own or operate a CPU or any data communications facilities. Rather, the underlying premise is that many desirable and often unique services already exist but are known only to a small, local group of users.

By making such services known and remotely accessible, a facilitating network can increase the options available to faculty and students and expand the community of users for those institutions that agree to supply services.

Few facilitating networks exist on a national scale, and those that do tend to be single-purpose. For instance, the Health Education Network (HEN) facilitates access to resources in the health sciences. Cache, another nonprofit organization, makes specialized packages available for instruction in chemical engineering.

General-Purpose Net

Edunet is the only general-purpose national facilitating network. Begun as a prototype activity initially sponsored by 22 major universities, Edunet provides members of the higher educational community with the option of selecting among DP resources ranging from interactive statistical packages and analytical research tools to advanced computer-assisted instructional (CAI) materials in virtually every college discipline.

For instance, more than 18 law schools, including those at Harvard University and American University, are currently using CAI programs in law based at the University of Minnesota. These materials, developed by two leading legal scholars, are recognized as among the finest such aids in legal education.

In addition, two schools of library science and education in North Carolina are using Wise — an information storage and retrieval system developed at the University of Wisconsin that is suited to bibliographic data bases. They are using Wise to train their students in on-line search and retrieval techniques.

Without Edunet, these and many other computing resources would be unavailable because of the costly, time-consuming and sometimes technically infeasible process of transporting software to a local facility.

Uses Value-Added Networks

While Edunet makes the human connections, collects and disseminates resource information, handles accounts and provides remote user support, it has looked to the communications services offered by the value-added networks for the physical connection between Edunet users and suppliers.

Most Edunet suppliers have a dedicated host connection to the Telenet network. Two suppliers are also connected to Tymnet, Inc. The 13 Edunet suppliers and their hardware facilities connected to Telenet and/or Tymnet include:

- Cornell University (IBM 370/168).
- Dartmouth College (Honeywell Inc. 66/40).
- MIT (Honeywell 6180, IBM 370/168).
- Merit Computer Network: University of Michigan (Amdahl Corp. 470V/6), Michigan State University (Control Data Corp. CDC 6500) and Wayne State University (Amdahl 470V/6, IBM 370/67).

The Power.

Higher speed... superior performance... increased network versatility... these are the powerful new features of the Codex LSI 24/24. The first modem to provide 2400 bps full-duplex operation on the dial (DDD) network.

The LSI 24/24 opens up a new level of network applications: from upgrade of 1200 bps two-wire, full-duplex operation, to 2400 bps dial operation for full-duplex protocols, to new opportunities for digitized voice.

Codex, a world leader in data communications technology, is dedicated to providing a wide range of advanced products to meet the demanding requirements of on-line data communications networks.

Codex – The Power in data communications!

codex
We'll get you through

member of IDCMA

Codex Corporation, 20 Cabot Boulevard, Mansfield, Mass. 02048 • Tel: (617) 364-2000 • Telex: 92-2443
Codex Corp., 2-8, 1-Chome, Yotsuya, Shinjuku-ku, Tokyo 160, Japan • Tel: (03) 355-0132 • Telex: 2324976
Codex Europe S.A., Av. de Tervuren 158, B-1150 Brussels, Belgium • Tel: (02) 762.23.51 • Telex 265-12

DP-Based Instruction and Research Resources

- University of Minnesota (CDC 6400).
- State University of New York at Albany (Univac 1110).
- University of North Carolina (two IBM 370/165s).
- Rice University (IBM 370/155).
- Stanford University (IBM 370/168).
- University of Wisconsin (Univac 1110).
- Yale University (IBM 370/158).

The two other Edunet suppliers currently accessible via long-distance dial-up connection are the University of Illinois at Urbana with a CDC Cyber 175 and the University of Notre Dame with an IBM 370/168.

For access to Edunet suppliers connected to Telenet, users in more than 150 locations in North America need only make a local call and issue a command to select the desired Edunet host CPU.

Several schools, including Cornell, Stanford, and those that participate in the North Carolina Educational Computing Service, need not even make a local call, since the local terminal network has a direct user access port connected to Telenet.

Billing Procedure

Generally, Edunet suppliers are billed directly by the value-added carriers for the fixed cost of the dedicated host connection and for the variable usage costs, which in the case of public dial access to Telenet is $3.25/hour plus a small volume-based packet charge.

The rebilling strategies of Edunet suppliers vary, but in most cases a communications surcharge is added to the normal charge in order to recover costs. The full communications costs are typically between $4/hour and $7/hour when public dial access is used (and less for those schools that have direct user access ports).

This compares favorably with an average communications cost of a direct dial-up call of more than $20/hour.

The low cost of the value-added data communications services has substantially enhanced the economic viability of Edunet. However, cost savings is not the only benefit provided by the value-added carriers.

The conversion of otherwise incompatible transmission codes and formats makes it possible for almost any user terminal, regardless of make or model, to access the systems of Edunet suppliers.

Faculty, students and others in the academic and research community are able to find out about Edunet products of interest to them in one of two ways.

One important channel is through the information dissemination activities of the Edunet staff and campus liaison. One-page supplier fact sheets provide summary information on hardware and software resources of Edunet suppliers. The *Edunet News*, a quarterly publication with a circulation of 10,000, keeps its readers abreast of current Edunet offerings.

In addition, an on-line catalog containing abstracts and other information on more than 500 programs offered by Edunet suppliers is maintained in the Edunet resources data base that can be searched for key words under the Spires system at Stanford University.

Use Via 'Hotline'

The second means of locating Edunet resources is through user inquiries outlining specific [illegible] specific programs. Such users are encouraged to make requests via a toll-[illegible] Edunet Hotline.

In response to these [illegible] requests, the staff combines data base searches [illegible] broadcasts via Telemail [illegible] message system at the University of Wisconsin and *Edunet News* Want Ads [illegible] to locate appropriate resources.

[illegible] computer [illegible] from 100 [illegible] *Edunet*

WHY IS WESTI THE BEST BUY IN T.P. MONITORS?

Westinghouse uses the most modern programming techniques to continually enhance WESTI. This provides Ⓦ users with the most advanced capabilities in TP monitors. WESTI users associate their TP system with sophistication, flexibility and efficiency second to none. Since 1969, the family of WESTI users has grown to over 550 world wide.

SOME OF THE REASONS HUNDREDS OF USER'S HAVE SELECTED WESTI ARE

- True multi-threading
- Full Task/Terminal Dispatching
- Asynchronous task processing capability.
- Dynamic on-line programming system SCEPTER (optional)
- Multi-thread Data Base Interface
- No pre-compile processing overhead required
- 12 system and programming support utilities
- On-line screen mapping support
- Highly efficient logging facility/transaction file
- Fully integrated command level Data Management/Data Entry facility
- Total DOS (VS) release independence
- Only T.P. Monitor ever to achieve the Datapro Honor Roll in 1975, 1976 and 1977
- Organized WESTI users associations
- One time charge (regardless of number of terminals).

THAT'S WHY!

NOW, join the family of over 550 users of the best TP Monitor available! Call (412-256-5583, 5584) or return coupon today to

WESTINGHOUSE ELECTRIC CORPORATION
Computer and Instrumentation Division
2040 Ardmore Boulevard
Pittsburgh, Pa. 15221

WESTINGHOUSE ELECTRIC CORP., Computer and Instrumentation Division
2040 Ardmore Boulevard, Pittsburgh, Pa. 15221

Please send additional WESTI info to: (Please print)

Name: ______________ Title: ______________
Phone ( ) ________ Comp. Mod. ________ Op. Syst. ________
Company: ______________
Address: ______________
City: ______________ State: ________ Zip: ________

I would like information on these Westinghouse Products.

☐ SCEPTER [illegible]
☐ DISK UTI[illegible]
☐ JOB MON[illegible]
☐ DISK SP[illegible]
☐ WESTC[illegible]
☐ DOK[illegible]

TP plans are ☐ immediate ☐ 3-6 months ☐ over 6 months.

SNA Acceptance to Grow Despite Uncertainty

(Continued from Page S 4)

nounced support for previously SDLC-only terminals under bisynch protocols and the TCAM access method.

Later in 1976 the company announced a multisystem networking scheme, increasing the architecture's attractiveness to the big networkers.

More recently the Series/1 was allowed into the SNA fold.

Finally, just last month, the company announced the 8100 information system as an SNA product — yet it supports non-SDLC protocols and terminals, including the 2740.

Hardware Offerings

A second way in which the equation is being rebalanced in favor of SNA is through IBM's related hardware offerings, specifically the 30 Series processors.

The overwhelming demand for the new systems is common industry knowledge, but according to a recent Guide (IBM users group) survey, many large-scale commercial IBM users are also switching to MVS — primarily to take advantage of the 30 Series hardware.

Once MVS is installed for reasons independent of network blueprints, it becomes easier to justify a conversion to SNA. Another building block has been winched into place.

Acceptance Predictions

By combining the results of the IDC users survey with IDC's forecasts about the 370/30 Series population through the rest of the decade, some predictions can be made for SNA acceptance:

- 1978 and 1979 will be watershed years as SNA site population rises past 1,000 this year and approaches 2,000 next year. The number of sites will nearly double each year.
- By 1981, almost one-fourth of all SNA-eligible sites (370s, 30 Series CPUs on hand) will be running at least one SNA network. By dollar value of SNA-eligible systems on hand, that represents 45% of that SNA-eligible base.
- By the end of this year, more than 10% of the installed base of 3270s, excluding plug-compatible manufacturers' (PCM) terminals, will be running under SDLC. By 1981 that number will rise to 30%.

Again we ask: is SNA a flop? Put it this way. It was, but it isn't likely to remain so for long. Now that the 8100 has pried open the SNA window a bit — allowing the blueprint to encompass more old terminals and protocols — and the 30 Series CPUs have begun shipment, there is more impetus for conversion. SNA is more attractive (or less unattractive, depending on how you look at it).

On the Road

There are still some uncertainties, of course. AT&T's Advanced Communications Service (ACS) could put a damper on the migration to SNA simply because the older IBM terminals will be supported. But ACS won't hit its "salad days" until the mid-1980s and beyond. By then, SNA will be established — and perhaps its working definition changed — such that ACS will no longer be a threat to the IBM blueprint.

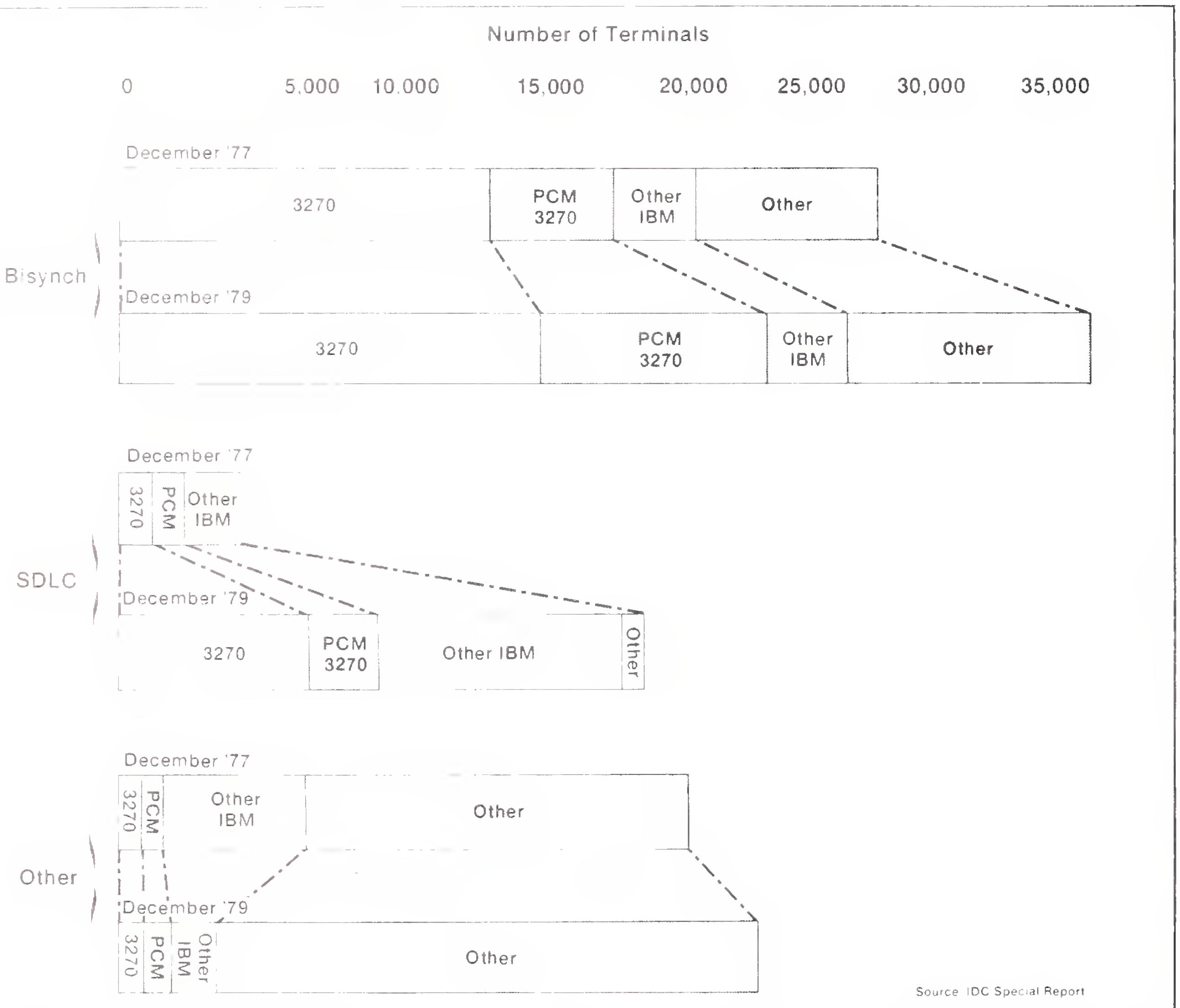
The move to international data communications standards, especially X.25, could retard conversion to a network architecture that didn't support them.

On the other hand, while IBM may be forced to include interconnection to public nets running under standard protocols (witness IBM's X.25 adapters for Transpac and Datapac), it may do so without gutting the entire SNA concept, at least not for a long, long while.

Block by block, kilobyte by kilobyte, selectable unit by selectable unit, IBM's Grand Design will be carried out. All roads lead to SNA. Those roads not leading there will ultimately become the ones "less traveled by," but the users are ambling, not racing on their way.

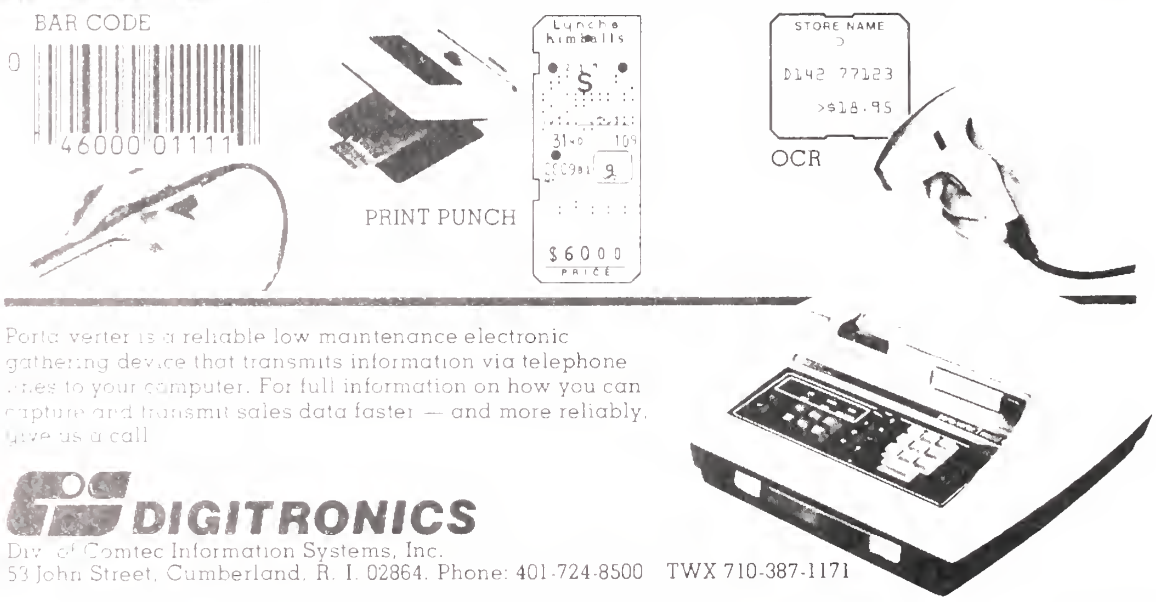
The survey mentioned is part of the report "SNA and the User: A Troubled Marriage?" published by IDC. Copies may be obtained for $95 from IDC, 214 Third Ave., Waltham, Mass. 02154.

Gantz is editorial director and editor of IDC's Distributed Processing Newsletter.



Source: IDC Special Report

Figure 2. Terminal Growth by Protocol


WHETHER YOU USE BAR CODE, PRINT PUNCH or OCR TICKET READERS, PORTA-VERTER CAN CAPTURE AND TRANSMIT YOUR DATA DIRECTLY TO YOUR COMPUTER.

Porta-verter is a reliable low maintenance electronic gathering device that transmits information via telephone lines to your computer. For full information on how you can capture and transmit sales data faster — and more reliably, give us a call.

DIGITRONICS
Div. of Comtec Information Systems, Inc.
53 John Street, Cumberland, R. I. 02864. Phone: 401-724-8500 TWX 710-387-1171

Raytheon's PTS/1200 MARK·I

Super source data entry in a smart 3270-type system.

You probably know Raytheon terminals best for their ability to add local intelligence and processing capabilities to established 3270-type terminal networks.

But there is another side to them as well.

The source data entry side. Simply add Raytheon's new Source Data Entry Package to our MARK·I distributed processing controllers, and our 3270-type terminals gain a new dimension—as highly powerful source data entry devices.

Raytheon's MARK·I with SDEP possesses many of the capabilities found in dedicated data capture, RJE, key-to-disk and other document conversion products. But they cost less and can do much more. So you can use MARK·I systems as a single standard product line for on-line applications of all types.

Seven advanced data entry features

With our new Source Data Entry Package, here are just a few new capabilities you can get right now on your terminal-based systems.

Cursor Skipping. You can define what fields a cursor should move to, and which to skip, during routine data entry operations. A nifty little feature that allows the person who has the information to complete format filling much faster. It is so convenient, you don't need dedicated data entry clerks.

Reasonableness Checks. A series of systems features that helps prevent gross data entry errors. Every MARK·I can perform range checking, validation checking and user-defined field compares. Extra insurance that your first data entry step is right.

Crossfooting and Arithmetic Computation. The mathematical extensions used so commonly in applications such as order entry, invoicing, and accounting are delivered automatically by the MARK·I, line-by-line, record-by-record.

And batch-by-batch. Because SDEP also performs **Batch Balancing,** as a further check on the accuracy and count of each record batch prior to introduction into your system in either a local mode or as a remote batch transfer.

Record Searching. When you must find a specific record fast, the MARK·I makes it happen. You can search by record number, by field, or by task, so even partial information is all you need to find a record quickly.

Table Look-Up. A major labor-saving feature in dedicated data entry functions, it provides large volumes of pre-edited and pre-stored data that operators call to the screen easily for high-speed record completion with impeccable accuracy.

And **Record Insert/Delete.** Batches of records traditionally form the core of most volume data entry applications. When you want to add one, or remove one from a batch, the MARK·I lets you do it easily. All it takes is a few keystrokes. The system does the rest.

Your other applications work concurrently.

Don't let these powerful source data entry capabilities inhibit you. They are just part of what a MARK·I will deliver. While some of your terminals are in data entry mode, the rest can be doing a variety of other tasks, such as inquiry response or local processing.

Raytheon's PTS/1200 MARK·I. It's what you always wanted a terminal system to be.

Raytheon terminals. 60,000 now, and growing fast.

Tell me more about Raytheon's Source Data Entry Package and the MARK·I distributed processing system.

I also have a requirement for:

- 3274/3276-type terminals
- Large capacity distributed processing systems
- SDLC protocol-supported terminal and banked network capability

Name

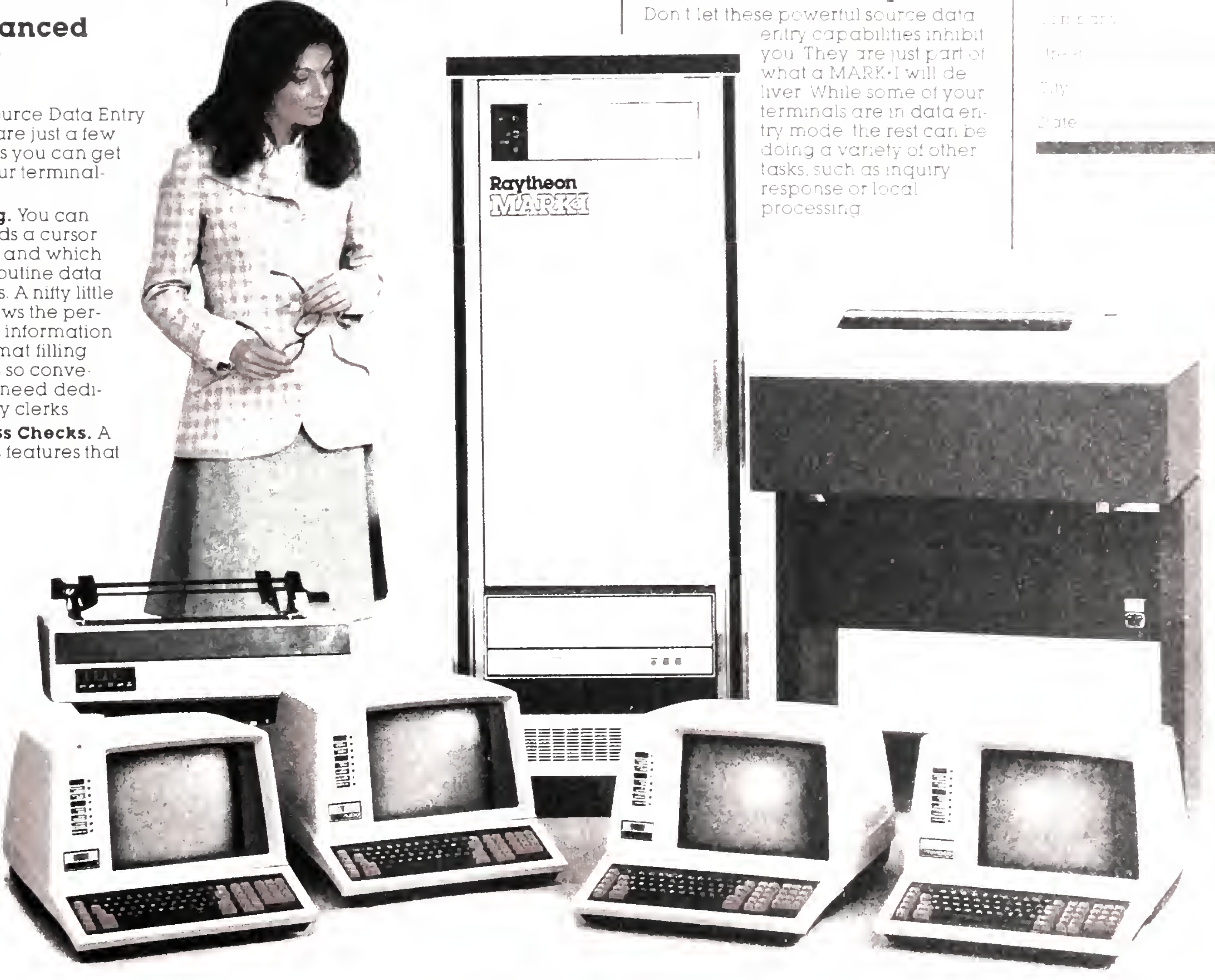
Title

Company

Street

City

State Zip



RAYTHEON

RAYTHEON DATA SYSTEMS

Intelligent Terminals · Distributed Processing Systems · Word Processing Systems · Minicomputers · Telecommunications Systems

1415 BOSTON-PROVIDENCE TURNPIKE · NORWOOD, MASSACHUSETTS 02062

Call Director, Field Marketing, at (800) 225-9874 (toll free) Inside Massachusetts call (617) 762-6700 · TWX 710 336-0646 · TELEX 92-4408

Word Processing Division: Lexitron Corporation, 9600 DeSoto Avenue, Chatsworth, California 91311 (213) 882-5040

ALBANY (518) 458-7434 · ATLANTA (404) 321-3064 · BOSTON (617) 237-4190 · CHICAGO (312) 694-4420 · CINCINNATI (513) 772-2200 · DALLAS [illegible]
DENVER (303) 371-0990 · DETROIT (313) 358-3990 · GREENSBORO (919) 294-5811 · HARTFORD (203) 289-8281 · HOUSTON (713) 496 0100 · KANSAS CITY [illegible]
LOS ANGELES (714) 979-5800 · MIAMI (305) 592-3884 · MINNEAPOLIS (612) 854-2666 · NEW YORK CITY (212) 661-2790 and (212) 895-2567 · PHILADELPHIA [illegible]
PITTSBURGH (412) 281-2117 · SAN FRANCISCO (415) 692 4640 · SEATTLE (206) 453-0650 · TULSA (918) 663 7852 · WASHINGTON, D.C. [illegible]
OVERSEAS AMSTERDAM (020-93-0787) · FRANKFURT (49-6196-48829) · SYDNEY (61-2-297721)

Network Helps Chrysler Dealers Accelerate Vehicle Repair Process

The computer can match an order to the right part even if an outdated part number is used.

CENTER LINE, Mich. — Chrysler Corp. and its service and parts dealers have reported increased customer satisfaction with vehicle repairs since it installed a computerized parts order system. The on-line system, called the Mopar Parts Connection, currently links nearly 1,000 participating dealers' parts departments directly to Chrysler's central mainframe here with a communications network.

The "Connection" provides up-to-the-minute status for any of 150,000 parts ordered by dealers through any of Chrysler's 19 regional parts depots across the country, enabling Chrysler service managers to schedule work and assure customers vehicle repair on a predictable schedule.

Loren Bertran, parts manager at Van Ness Chrysler-Plymouth-Dodge in San Francisco, inputs a parts order to Mopar.

The Mopar Parts Connection is made through Tymnet, the public packet network operated by Tymnet, Inc. A local phone call to the nearby network node connects the dealer to the parts data base on Chrysler's twin Amdahl Corp. 470V/6 computers here in Center Line.

Tymnet provides local telephone access to dealers in some 135 domestic access cities, while Chrysler provides Wats lines for dealers located outside of major metropolitan areas serviced by local Tymnet nodes.

Participating dealers lease an Alanthus Corp. 30 char./sec teleprinter, a wide-carriage terminal that provides a direct link to the Center Line mainframes.

Reaching Chrysler's Detroit-area parts CPU is an uncomplicated procedure. A special telephone number reaches a Tymnet communications processor (Tymcom) in a 'node' city. The Tymcom functions more or less like a traffic controller to route calls of many subscribers over the public packet network.

In a matter of seconds, the Tymcom recognizes the caller as a Chrysler dealer who wishes to communicate with the Detroit parts CPU. The connection is made and the mainframe signals that it is ready to receive input.

Thereafter, dealer service personnel are in direct communication with the system from their printing terminal stations, cutting out middleman functions and reducing errors to near zero.

Before the existence of the Mopar Parts Connection, dealers placed customer vehicle repair parts orders in one of two ways, both of which generated costly phone bills and were considerably more time consuming:

- A dealer could place a call

(Continued on Page S/11)

Parts Order System Speeds Chrysler Repairs

(Continued from Page S/10)

and leave a message through a code-a-phone, an electronic answering/recording device that prompts the caller for his requirements. This method was used for nearly half of Chrysler's parts orders.

- For special-handling orders, which account for about 3% of Chrysler's orders, dealers placed long distance phone calls to an expediter at the nearest of the 19 parts depots. The expediter would then transmit orders on-line and make inquiries of the central mainframe.

Now, dealers using the Mopar Parts Connection access the computer directly and get fast response. They can determine from which of the 19 depots a part will be shipped, how the shipment will be made and when the item will arrive. They also can check status on earlier orders.

Ralph Davis, assistant parts manager at Clyde C. Netzley, Inc., a Plymouth-Chrysler dealer in the Chicago area, likes the speed and simplicity of the network. "It takes only a minute or two to establish connection with the Detroit computer, and the codes we have had to learn aren't all that complicated or numerous," he said.

Davis and his co-workers who use the Mopar Parts Connection computer up to 10 times a day estimate they save more than an hour a day over the old method.

A key feature of the computerized system is the ability to update parts numbers. There are some 150,000 different parts in the data base, and a single parts number can change up to five or six times in several years. The Connection will take an old [illegible] into the system [illegible]

[illegible]

Bertran cross-checks Chrysler parts received against the terminal printout produced when he initially ordered the items.

mitted to him, inventory levels are automatically adjusted and the part is ordered from the nearest depot.

Knowing which of the 19 parts depots the part is being shipped from is a special advantage, observed Loren B[illegible], parts manager of Van Ness Chrysler Sales and Service Corp., San Francisco. "Our service people can be reasonably [illegible] when notifying a [illegible] most cases the [illegible] vehicle can [illegible] helpful to us [illegible]

[illegible]

Liquids, the most adaptable of all matter, shape themselves exactly to fit their containers.

In much the same way, a Datapoint ARC system adapts itself to fit the needs of a business.

In this day when competitive edges are frequently slight and often difficult to come by, you have to out-think your competition to gain an advantage. The Attached Resource Computer system can help by putting powerful data processing capability at the hands of those who need it most, wherever they are in the company.

Not just another network

An Attached Resource Computer system is an arbitrary number of small, powerful, inexpensive computers, each performing its assigned tasks independently, yet all are totally interconnected to share common resources and draw from a common database. For high reliability, the system is composed of proven Datapoint processors and peripherals.

One of the ARC system's strengths is its specialization of components. One or more processor in each system is dedicated to file processing and management. The others are applications processors. Internal communications are achieved by an Interprocessor Bus, using dedicated Resource Interface Modules (RIMs).

This capability frees a computer from juggling all three functions. Consequently, processing can be carried out at much higher throughput. Even though the processors are functionally dispersed, the system is a single, unified computing facility, with the processing speed and capability of a large, conventional computer.

Solves growth problems

This new, modular architecture offers easy-to-implement solutions to the problems of system planning and growth. The system manager can add (or delete) processors or file storage as workloads change.

Expansion can occur in modular, incremental steps, at predictable, affordable costs. Only enough processing power is required at a given time to accomplish the immediate workload. Important capital is not tied up in costly overcapacity, yet the work is not delayed by a bogged-down, overworked computer.

Protects software investment

The ARC system can use your present Datapoint system software. When additions are made to the system, current software is not affected. All the Datapoint resources suitable for participation in an ARC system are completely compatible.

While direct hardware cost comparisons are difficult because of differences in architecture, our studies indicate that the cost of an ARC system may be only 50% to 70% of the cost of a more conventional system with equivalent capabilities.

Total adaptability

The applications at work in an ARC system can be as varied as the diverse functions of the business environment. The concept applies to any type of firm engaged in one or multiple endeavors. Its usefulness is equal whether it's in a corporate home office, a division headquarters, or a remote office. Or all three can simultaneously employ their own ARC or other Datapoint systems and interconnect them through telecommunications links.

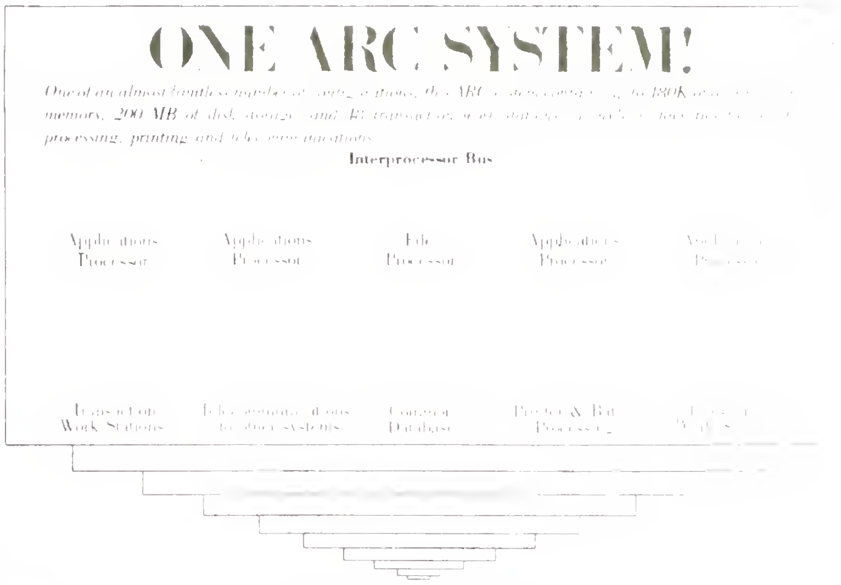
A nationwide support network

There are more than 500 Datapoint Customer Service Representatives in the field, stationed in over 130 local service area offices. The system is designed to place customer service and support as near as possible to Datapoint's 11,000 installations.

Write for more information

A Datapoint Attached Resource Computer system is the ideal solution to your business data processing needs. Datapoint has to out-think its competition. The ARC system puts us another big jump ahead.

A booklet describing the features and advantages of the ARC system is available by writing to Datapoint Corporation, Marketing Communications Dept. (M62), 9725 Datapoint Drive, San Antonio, TX 78284. Or call the Datapoint sales office nearest you.


ONE ARC SYSTEM!
One of an almost limitless number of [illegible], the ARC [illegible] 180K [illegible] memory, 200 MB of disk storage and [illegible] processing, printing and tele[illegible]
Interprocessor Bus
Applications Processor
Applications Processor
File Processor
Applications Processor
Transaction Work Stations
Telecommunications to other systems
Common Database
Printer & Bar Processing

◄ *The adaptability of an Attached Resource Computer™ system is another example of how Datapoint out-thinks its competition to help you out-think yours.*

DATAPOINT CORPORATION
The leader in dispersed data processing

TeleMaster™
[illegible]

Paul V. [illegible]
[illegible]
52 South Main Street
Spring Valley, NY 10977
914-356-0570

Service Reduces U.S.-UK Transmission Costs

By Barry D. Wessler
Special to Computerworld

The first transatlantic link in an emerging worldwide system of interconnecting public data networks went into operation this fall between the U.S. and the UK.

The International Packet Switching Service (IPSS) enables users on both sides of the Atlantic to send low-, medium- and high-speed data at costs that are related to volume and substantially lower than any other means of data communications.

IPSS is being offered jointly by the British Post Office (BPO), the three major U.S. international record carriers (IRC) and the Telenet Communications Corp. and Tymnet, Inc. packet networks in the U.S. Telenet has supplied the packet-switching equipment and software being used at both the BPO and the IRC gateways.

IPSS replaces the BPO's Data Base Access Service, which was limited to low-speed dial-up access from the UK to U.S. systems. In contrast, the new service is bidirectional. IPSS gives UK users access to data bases and remote computing systems in the U.S., and users in the U.S. access to similar resources in the UK.

For the first time overseas packet communications can be used for synchronous applications. Currently, computers or intelligent terminals using the CCITT X.25 protocol can communicate over the IPSS link at synchronous speeds up to 9,600 bit/sec.

Typical of the initial users of overseas packet communications service is The Information Bank, a subsidiary of *The New York Times*. Like many computer-based data banks, The Information Bank had not pursued the European market before because of what it considered prohibitive communications costs.

In 1977, when 300 bit/sec dial-up access to the U.S. became available, the firm opened a sales office in London and now has 40 to 50 clients in the UK and on the continent. The addition of 1,200 bit/sec dial-up access will make such data base services even more attractive to UK users, since it will lower total communications costs.

Among companies looking at IPSS for synchronous applications such as computer-to-computer file transfer is Prime Computer, Inc. Prime sees IPSS as a more timely means of keeping track of production scheduling and sharing program files between its R & D groups at corporate headquarters in Framingham, Mass., and Bedford, England.

Economics Of IPSS

The users who are likely to benefit the most from IPSS are those who need to transmit less than 500 hours of low-speed data per month or less than 100 hours of higher speed data per month.

For lower speed applications, 1,200 bit/sec or lower, the best previous alternatives were Telex at $153/hour and Datel at $108/hour.

For medium- to high-speed transmission, international leased channels are an economical alternative for only the very largest multinational companies that can justify the cost of $9,090/mo for a dedicated line.

The actual cost of an alternate voice/data (AVD) channel between London and the U.S. is well over $10,000 when all the associated costs are taken into consideration.

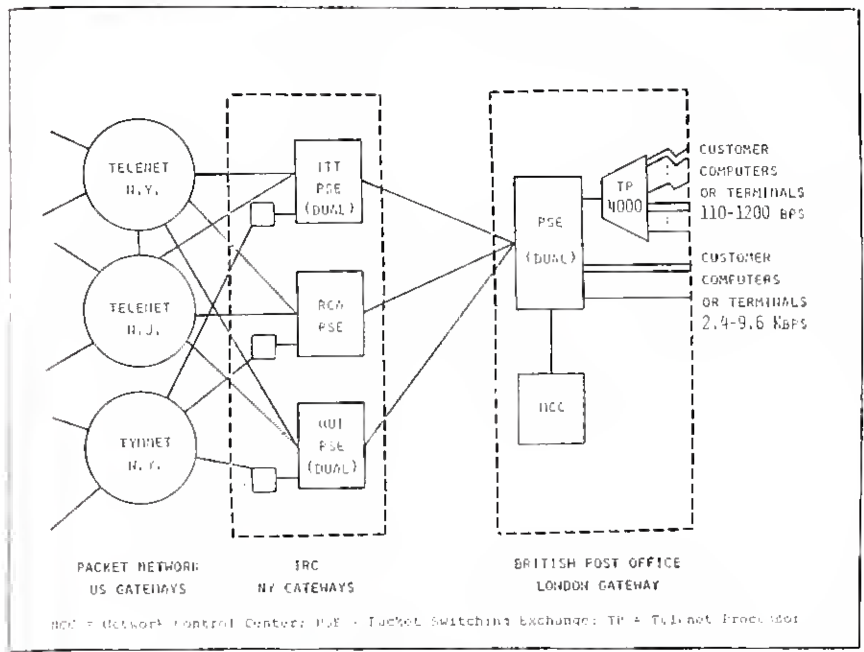
In contrast, IPSS rates average $22/hour for 300 bit/sec service and $24/hour for 1,200 bit/sec service, including connection time and traffic charges. For batch transmission at 2,400 bit/sec, usage charges are expected to average $110/hour, and for 4,800 bit/sec, $210/hour. These charges are the same regardless of the user's location in the continental U.S.

Perhaps the most exciting feature of the service is its ability to handle synchronous inquiry/response terminals of the type widely used within the U.S. for order entry applications.

(Continued on Page S/13)

	Speed	Cost
International Leased Channel	2,400 to 9,600 bit/sec	$9,090/mo
Telephone	Voice grade	$108/hour ($81 off peak)
Telex	50 bit/sec	$153/hour
Datel	1,200 bit/sec	$108/hour
IPSS/Telenet	300 bit/sec	$22/hour
	1,200 bit/sec	$24/hour
	2,400 bit/sec	$110/hour
	4,800 bit/sec	$210/hour

Rate Comparison for U.S.-UK Communications


TELENET N.Y.
TELENET N.J.
TYMNET N.Y.
ITT PSE (DUAL)
RCA PSE
WUI PSE (DUAL)
PSE (DUAL)
TP 4000
NCC
CUSTOMER COMPUTERS OR TERMINALS 110-1200 BPS
CUSTOMER COMPUTERS OR TERMINALS 2.4-9.6 KBPS
PACKET NETWORK US GATEWAYS
IRC NY GATEWAYS
BRITISH POST OFFICE LONDON GATEWAY
NCC = Network Control Center; PSE = Packet Switching Exchange; TP = Telenet Processor

Packet-Switching Service for U.S.-UK

Expanded Network Service Cuts Transmission Costs

(Continued from Page S/12)

Raytheon Data Systems Co. already has an X.25-compatible cluster controller system that can be used over packet networks. Called Raypac, this system operates in conjunction with IBM 360s and 370s and provides users with the functional equivalent of IBM 3270 terminals.

In this example, the host end interfaces to the packet network through Dmep, a software package for IBM 3704/3705 communications controllers.

The economics of IPSS make it very attractive for U.S. companies to extend order entry and other synchronous inquiry/response applications to Europe.

The total cost of the service works out to approximately $4,700/mo, less than half the cost of an overseas leased channel. Of that amount, the user will pay about $1,600 for holding time, $2,400 for traffic charges and $700 for the local port and access line at the UK end.

System Facilities

In order to broaden its overseas packet communications services, the BPO has installed a fully redundant packet switching node and network control center, similar to the equipment developed and used by Telenet in its domestic network.

The minicomputer-based processor is used to switch traffic and to concentrate synchronous traffic from subscriber computers and intelligent terminals. Asynchronous dial-up and dedicated lines from subscriber terminal terminate in the processor.

The IPSS network control center, a minicomputer-based system, provides the BPO with downline loading of software, centrally controlled remote diagnostics, continuous monitoring of network operational status and collection of statistical and accounting data.

Cable facilities operating at 9,600 bit/sec link the BPO packet-switching exchange (PSE) with similar facilities in New York, operated by ITT World Communications, RCA Global Communications and Western Union International.

Each of these three separate overseas routes is backed up with standby lines in case of cable failure.

The BPO currently interconnects with the U.S. IRCs using an enhanced X.25 protocol. The CCITT X.75 protocol for network-to-network transmission is expected to be implemented during 1979.

At the U.S. end, the record carriers connect into the Telenet and Tymnet packet networks for nationwide distribution of data.

The Telenet network is doubly connected to each IRC at network switching centers in New York and Newark, N.J. This dual gateway configuration permits alternate routing of data along the fastest route available at any given moment.

International connections with the Tymnet network are made in New York through a gateway located at each IRC packet switching exchange.

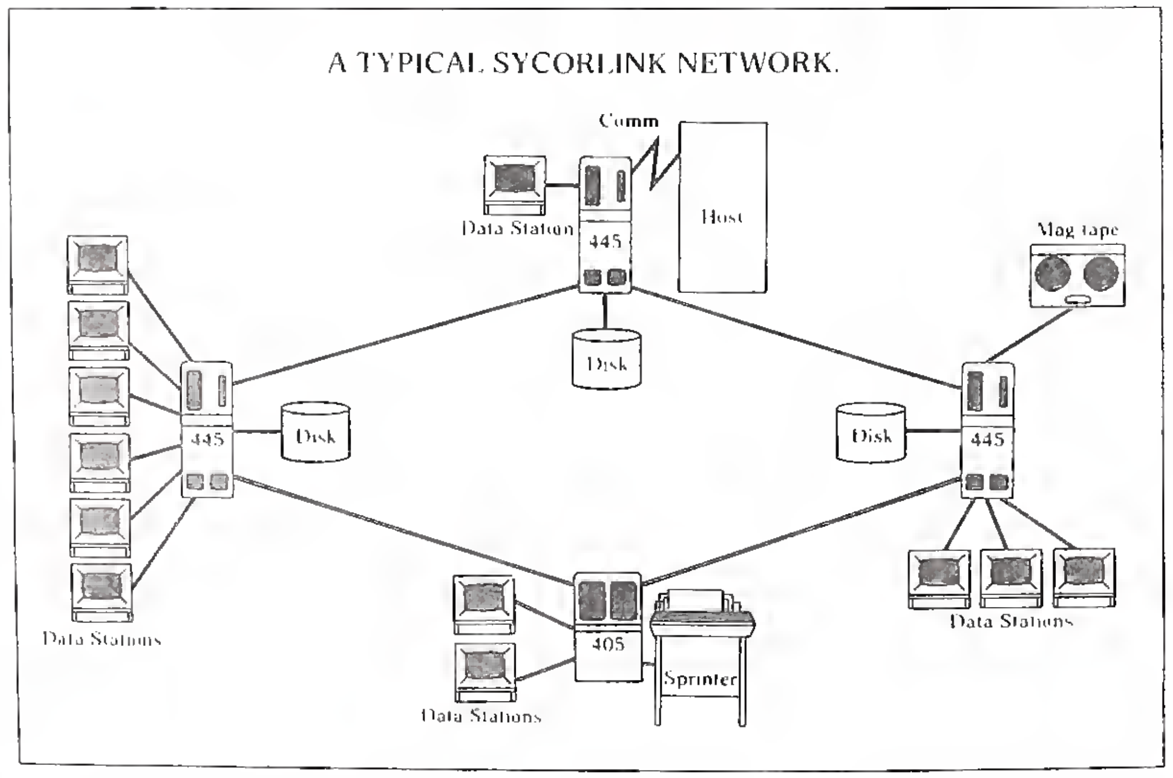
In deciding whether to use IPSS, an important consideration for users is the level of service quality that IPSS and packet networks in general provide.

With redundancy built into each individual component of the service, no failure of any one subcomponent can affect service.

In addition, the packet-switching exchanges perform error checking and retransmission of data and thus compensate for the high error rate often associated with international transmission facilities.

Users should be looking at IPSS as a prototype for the way in which overseas data communications will soon be handled throughout the world.

Wessler is a vice-president of Telenet Communications Corp., Vienna, Va.



Now you can divide and conquer.

A TYPICAL SYCORLINK NETWORK.

Sycorlink™ is a revolutionary resource sharing feature that lets you distribute the power and resources of computer systems throughout your organization. And conquer the problem of providing all your departments with the services they're looking for. At a price you're looking for.

In a nutshell, the Sycorlink networking feature is distributed processing the way it was meant to be.

Put the power of your network at every work station.

With Sycorlink, every system in the network can be tailored to handle the processing tasks of individual departments. And at the same time give authorized users in any department the power to access the files and peripherals of every other system in the network.

A user at any work station can access any file on any disk in the network. At the push of a key. Any file on any disk can be printed on any printer in the network. Any file can be transmitted to the host.

Any system in the network can process data from any file on any disk located at any other node in the network. And a system can be dropped out for maintenance or service without disrupting the flow of data to and from any other node.

Match the workhorse to the work load.

The Sycor 405 and 445 distributed processing systems can be mixed and matched in a Sycorlink network to create individual processing nodes with just the right amount of power for a specific department or location.

And while each node may be individually configured, it can access the files of another node just about as fast as its own files. Communicating this fast within the network allows nodes to share expensive peripherals, such as a line printer. So any way you put it together, your Sycorlink network has the performance capability that can get your job done. The way you want it done.

This means you never have to overequip any location, paying for power you don't need. Your first step in building your distributed processing network is the right one — with nothing to trip you up down the road.

Get started on a no-detour growth path.

The upward compatibility of the Sycor 400 series lets you grow your network without redesigning your system or replacing hardware. We call it planned nonobsolescence.

As your needs at a specific site grow, our compatible 405 and 445 systems let you upgrade without reprogramming or introducing unfamiliar hardware to your operators.

Install systems up to a half mile apart.

A Sycorlink network permits installation of systems up to a half mile away from each other. The systems are connected to each other by coaxial cables. This lets you increase your computer power simply by adding another system to the network. Without reprogramming.

Sycor's security-conscious software makes sure all disk files can be protected to prevent unauthorized access. You get peace of mind. And costs are kept to a minimum.

Link up your departments with Sycorlink. Call 800-521-2838 toll-free.

Sycor pioneered the concept of distributed data processing more than ten years ago. Since then we've been at the cutting edge of distributed processing technology. With over 100 service centers located within a half-hour drive of 1750 North American cities, and 40,000 systems installed, we're ready to help you bring your users state-of-the-art service in distributed processing. They deserve it.

To find out more about how Sycorlink can help you conquer distributed processing problems, call Tony Fazio, VP Sales, at the number above. In Michigan, call collect, 313-995-1170. Or write Sycor, Inc., Ann Arbor, Michigan 48106.

Better yet, contact a nearby sales office. We're in the Yellow Pages under Data Processing Equipment.

Sycor puts computer power where the work is.™

SYCOR®
a Northern Telecom company

You'd probably like to switch over from your IBM 3270's to more versatile equipment, but you're not ready to bite the bullet. Well, there's a complete terminal system that will make the change painless because it's 100% IBM plug compatible. A terminal system with features you won't get from IBM for years, if ever. A terminal system that can easily provide special functions. A terminal system that's software modifiable to future changes in network line protocol requirements.

The terminal system is the Trivex Plus 70. And in addition to having all the functional capability announced by IBM, Trivex 3270 compatible units offer you those valuable extras that can make your job a whole lot easier.

Maybe you're thinking: "That's fine, but what makes you think my company would be interested? Can it meet the unique requirements of my 3270 application?"

Well, that's precisely where our Trivex Target Test comes in. Check it out. In about 60 seconds you'll know whether or not you should give Trivex a call.

The Target Test

CHECK ONE	YES	NO
1. Does a single device failure take your complete cluster off line?	☐	☐
2. Does a single device failure take your complete channel down?	☐	☐
3. Will remote communication speeds, switch selectable, up to 19.2KBS improve your network efficiency?	☐	☐
4. Do your programmers need more information displayed to efficiently develop and debug software?	☐	☐
5. Are there one or more special functions you need to make your job a lot easier?	☐	☐

Results:
Score 20 points for every "yes" answer. If you scored 20 points or below, you've got nothing to complain about. Don't change a thing.

If you scored 40 points, you may not make the switch yet, but an inquiry is in order.

If you scored 60 points, call us and ask for application information.

If you scored 80 points or over. BULLSEYE! Call us right now. We'll send a salesman out to see you.

He can tell you about our high resolution, non-glare CRT, OCR wand, and local display-to-print capability. Or you may be interested in our statistical package or 10-key numeric pad or cursor position indicator. Whatever target you're aiming for Trivex can help you hit the mark.

3180 Red Hill Ave., Costa Mesa, Ca. 92626
Phone (714) 546-7781, (800) 854-3810 or
854-3819 • TWX (910) 595-2589

TRIVEX

Offices in: San Francisco, Calif. (415) 386-6344 · Oakbrook, Ill. (312) 325-8108 · Detroit, Mich. (313) 528-2175 · Ft. Lee, N.J. (201) 461-4712. European Distributor: Synelec, Telex 22114 Paris, Brussels, Munich, Amsterdam

Don't Replace Your 3270s Without Taking The Trivex Target Test.

Dutch Bank to Start Up X.25-Based Network

(Continued from Page S/2)

activity. As shown in Figure 1, there are no constraints on the directions of message routing, and the network allows processing and distribution in locations other than the existing Amstelveen and Tilburg DP centers, as well as backup processing by one or the other of these two centers.

Although long-term operational experience with Comsys is yet to be gained, Amro has a great deal of confidence in the basic concept of such a flexible, general-purpose network, even in the light of networking developments that have occurred during the two years since the project's inception.

General Structure

Figure 2 shows the general structure of the Amro network in its initial configuration. The dual-processor DS714, located in the DP center, controls the network and provides all the network services. The host mainframe, an IBM 370/168 multiprocessor system utilizing IMS, is linked to the network via Philips P856 minicomputers equipped with special channel adapter hardware.

The hardware/software characteristics of the channel interface emulate two standard 370 subsystems, one for each direction of transmission. This permits full-duplex operation at channel speed and ensures that any forseeable traffic volume can be accommodated. The channel connection has no influence on the operation of the host system; standard IBM interfaces are employed.

The network interface devices are functionally part of the host system, which is connected to the network as a normal subscriber in accordance with X.25 procedures.

In addition to the data-link handling software that controls the connections to the DS-714, the network interface devices contain one element of a special access protocol which applies to the high-speed exchange of information with the host system. Called Philips Channel Access Method 1 (Pcam 1), this element corresponds to a Philips Network Access Method 1 (Pnam 1) element in the host processor; together they control the link between the host processor and the X.25 network interface.

Other Pcam/Pnam protocols will be used with different host processors; they are independent of other Comsys components and can be replaced without affecting the remainder of the network architecture.

The Comsys software in the host system includes the elements required for message transport, as well as message management software which controls the interface with the application programs in the 370.

The relationship between the Comsys functions and the application software is such that absolute message accountability is guaranteed. No data can be lost, either implicitly or explicitly, without notification to the originator, and no data can be multiplied through retransmission.

Terminal Subsystems

The terminal subsystems used in the district offices are Philips PTS6000 transaction terminal systems. Each of the initial 75 terminals can control up to 24 devices, which may be connected locally or via leased telephone lines.

The back-office terminals used in the Amro network are CRT units and entry keyboards, and a wide variety of other types of PTS banking terminals may be incorporated for front-office use.

The network architecture provides a great deal of flexibility in terms of future growth and addition of new services. If justified by line-cost reductions, concentrators may be added to the packet-switching network to reduce the number of physical circuits to the switching node. The network may be connected to others (such as Swift, the international banking network) via suitable interface facilities.

Using a Telex concentrator, connections may be made from the net to the public Telex network. Additional host processor connections may also be made, initially to the existing DS-714 and possibly to new switching nodes, transforming the packet-switching net from a star network to a grid configuration.

User Facilities

The Comsys network is more than a pure transmission and switching facility; it is an intelligent network that provides Amro with a wide range of communications processing services including data storage and retrieval, logging and statistics facilities, broadcast message distribution and centralized network control. Assumption of many of the network management and control functions by Comsys relieves the host CPU and terminal facilities of these tasks and improves overall system efficiency.

Generally speaking, business data communications networks must provide services to two types of users: line users, the programming personnel who make use of the network to carry out the overall DP function, and staff users, who are the technical personnel responsible for the operation of the network itself.

In addition to its normal data transfer function, Comsys provides a comprehensive range of facilities and services to both these groups. The term "subscriber" as used here denotes an application process. There will always be such a process between the physical user (a person at a terminal) and Com-

(Continued on Page S/18)

THE PRODUCTS TO FIT YOUR NEEDS
THE PLAN TO FIT YOUR BUDGET

We solve communications equipment problems by tailoring equipment, service and a payment plan to suit your individual need. *Thot's Our Business.*

Quality terminal hardware from Digital Equipment, Omron, Extel, Teletype, Lear-Siegler and Techtran have been carefully selected to offer you the most reliable and popular equipment for private wire and switched network applications. A variety of rental, service, lease and purchase plans assure communications users the best price/performance value.

Our engineering, design and manufacturing capabilities are devoted to "custom-tailoring" standard terminal equipment. "Custom-tailoring" also means Service. Service that meets the need of your particular application. Where you are is where we will be.

If you have a feeling that your present or planned communications equipment doesn't "fit" . . . custom-tailor it . . . give CARTERFONE a call

Carterfone
Member of the Cable and Wireless Telecommunications Group

George Goodwyn, Vice President Sales
1111 W. Mockingbird Lane, Suite 1400
Dallas, Texas 75247
(214) 630-9700

SALES & SERVICE OFFICES:
Atlanta, Boston, Burlingame, Ca., Charlotte, Chicago, Cincinnati, Cleveland, Columbus, Dallas, Davenport, Ia., Denver, Detroit, El Segundo, Ca., Fairfield, N.J., Hartford, Houston, Jamaica, N.Y., Kansas City, Los Angeles, Memphis, Miami, Milwaukee, Minneapolis, New Orleans, New York, Norfolk, Oklahoma City, Omaha, Orlando, Philadelphia, Phoenix, Pittsburgh, Portland, Raleigh, Sacramento, Saginaw, San Antonio, San Diego, San Francisco, Seattle, St. Louis, Syracuse, Washington D.C.

"When D & Z bought its own computer to simulate the entire U.S. rail network, Prime was really the only choice."

Hugh W. Stewart, Vice President, Consulting Services Division, Day & Zimmermann, Inc., Philadelphia, Pennsylvania

Day & Zimmermann is one of the nation's largest and most diversified engineering, construction, and management consulting firms. Their Rail Analysis Model (RAM) is playing a vital role in the development of regional and national strategies for railroad revitalization.

RAM is also an awesome number-crunching application that was costing D & Z nearly $1 billion a year in outside computer services alone. When they decided to bring RAM in-house, D & Z found Prime offered the only medium-scale computer system with the power and versatility they needed. Yet the purchase price of their Prime system was less than half their outside costs for a single year.

Prime's family of interactive computer systems offers industry standard software including FORTRAN IV, BASIC, RPG II, COBOL, and a CODASYL-compliant Database Management system. They also have a greater memory capacity than any other family of small computers: up to 8 million bytes of high-speed main memory, 2.4 million bytes of disk storage, and 32 million bytes-per-user of virtual memory.

Prime computers are also true multi-user systems: one computer can handle up to 64 simultaneous users in such diverse activities as RJE communications, forms processing, on-line data entry, computational time-sharing, and database management. And the PRIMOS Operating System allows any user to use any language at any time.

For the detailed story of how Prime is helping Day & Zimmermann, and for more on how we might help you, contact Joseph A. D'Angelo, Director, Market Planning, Prime Computer, 40 Walnut Street, Wellesley Hills, Mass. 02181.

PRIME Computer
"Prime is helping"

Netherlands Bank Starting Up Private Network

(Continued from Page S/15)

sys, the facilities described are available to the application programmer, who determines whether and to what extent they will be visible at the terminal.

The line-user facilities include message transfer, file storage and retrieval, logging and statistics and service communication.

Message-Transfer Facilities

The message-transfer facilities include two alternative methods: transfer via a normal message circuit, in which case the originating and terminating subscribers are the only users of the virtual circuit while the connection exists, and transfer via a dedicated circuit shared by a number of subscribers.

In general, Amro uses normal message circuits for both bulk data transport and interactive traffic, but the free flowing dedicated circuit may possibly have advantages in future inquiry/response situations, particularly when a public packet-switching network is used in conjunction with Comsys.

All Comsys subscribers have symbolic addresses unique to the system. These are logical addresses connected to specific application processes and [illegible] by the system to [illegible] physical addresses involved.

[illegible] of this technique is [illegible] programs need not be [illegible] in the event of a network re[illegible] application is [illegible] part of the system to [illegible] flexibil[illegible] applications in the de[illegible] to handle [illegible] even more [illegible] applications [illegible] another in [illegible]

[illegible] reported [illegible] the [illegible]

[illegible]

[illegible] personnel to control the sessions without affecting the application programs. The use of priority assignment in conjunction with the flow-control facilities available gives the network great elasticity — traffic peaks can be flattened while retaining adequate response times for high-priority traffic.

One of the most important features provided by Comsys is the capability of storing and retrieving batches of information which cannot, or need not, be delivered immediately to their destination(s). The possibility of time-independent communications between processes has a number of advantages for both line and staff users and is of particular value when: the destination is not available at the time the originator wishes to transmit; the batch must be transmitted more than once, to different destinations; or the batch must be kept in fail-safe storage for a certain period of time.

Batch Manipulation

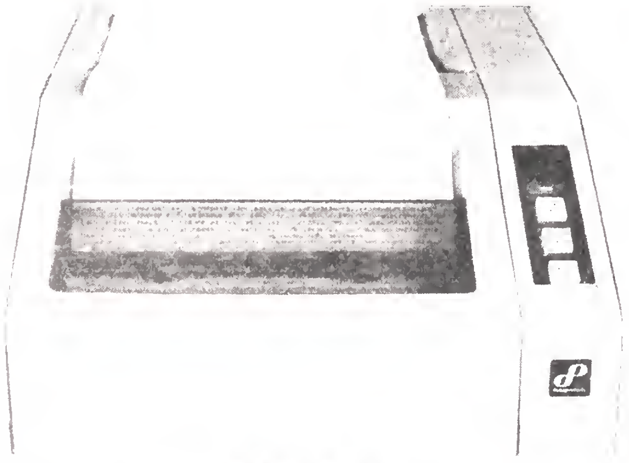
In addition to the storage and retrieval functions themselves, Comsys permits the manipulation of batches by means of such facilities as invalidation, destination change, status display and so on.

Comsys provides both line and staff users with a variety of possibilities for the collection of statistical information and the logging of both statistics and messages. Examples of such possibilities for the application programmer include counter logging, event logging and the logging of messages considered sufficiently important to warrant retention.

The system provides an operational interface for the exchange of messages between a line user and the central Comsys operator. An application can send a message to the Comsys operator at the central control location — this may be a request for guidance or assistance from a terminal operator or an alarm message on which immediate action should be taken. The Comsys operator may then send a message from the control position to all, or a selection of, the Comsys subscribers.

In addition to conversations between line users and the central operator, this broadcast facility can be used for such purposes as automatically informing

(Continued on Page S/27)



KEEPS QUIET. WORKS HARD. FOR VERY LITTLE.

Our T-80 Receive Only printer is a quiet unassuming sort. Doesn't take up much room on the desk. Doesn't make a racket while it's doing its work.

And it doesn't require a lot of money before it'll go to work. In fact, the T-80 runs less than $900 in OEM quantities. And it continues to save you money with its low cost of ownership.

On top of all this, the T-80 prints fast. 80 CPS fast. Which is nearly three times faster than most other thermal printers.

All these qualities — low price, impressive speed, high quality, and quiet operation — have combined to make the T-80 an absolute natural for applications that demand silence. Hospitals. Open office situations. Testing and instrumentation.

THE T-80 THERMAL PRINTER

And the T-80 is the logical supplement to your CRT if you want occasional hard copy printouts.

Now, you don't have to buy a T-80 RO to get T-80 performance. The basic T-80 mechanism, with the same unique operator-replaceable print head and driver electronics, is available as a module: the T-80 M.

So, it's up to you. Buy the complete T-80 RO, ready-to-run. Or just take the T-80 M mechanism and design your own printer around it.

Either way, you save money, and the T-80 goes quickly and quietly about its business.

Dataproducts

THE PRINTER COMPANY

Call or write for your nearest Sales Office or Distributor. 6219 DeSoto Ave., Woodland Hills, Ca. 91365. Tel: (213) 887-8451 Telex: 67-4734 • Darmstaedter Landstrasse 199, Frankfurt, W. Germany. Tel: 681-034, Telex: 841-416344.

Integrated Network Helps Firm To Yearly Savings of $600,000

DENVILLE, N.J. — On the third workday of the month, Jim Cotting, vice-president and controller of International Paper Co. (IP), gets worldwide earnings information. On the sixth day, he has a complete directors' statement of operations for the preceding month.

That's not bad for a $3.67-billion multinational corporation that at one time was almost completely decentralized.

That three-day business close — down from as much as 17 workdays — is partially the result of the company's integrated teleprocessing network.

Part of a centralization effort started in 1973, the net links 213 locations in the U.S. and abroad with regional IBM 370s in New Jersey and Alabama.

Supported by IBM's Systems Network Architecture (SNA) concept, the network literally makes IP a single company from a data communications standpoint — simplifying all connections between systems, terminals and transmission lines.

The network uses AT&T private lines, operates at speeds from 300- to 56K bit/sec and uses Codex modems at 4,800-and 9,600 bit/sec.

In addition to the accelerated financial close, the network has yielded an annual savings of $595,000, tightened control of transportation movements and provided a vehicle for on-line order entry of pulp and paper products.

Installed in 1977 after 23 independent data centers were consolidated into two regional data centers, it has even helped move some computing power back to remote locations through distributed processing.

James Mayer, corporate manager of technical development, commented, "In the past, too many projects to improve the flow of information at IP were complicated by technical constraints, particularly in data communications. The network has removed those technical barriers to achieving business objectives."

On Their Own

Those constraints were real enough. In 1973, IP was organized along functional lines, decentralized in DP with 23 data centers and 26 mainframes. Each major location had its own system uses and its own equipment, and there was almost no exchange of information between sites.

"We were truly decentralized, with little effective control," Mayer said. "Each location was basically on its own. Limitations of teleprocessing prevented any real integration of computer functions. Each application included its own communications support.

"To enhance the application — or interface it with similar work at another location — required a change of application software and teleprocessing support, which was usually too costly.

"In addition, the only companywide facility for reporting to headquarters was a teletypewriter network used for message switching. It was an antiquated, unsophisticated, paper-tape-oriented operation wholly unsuited to our needs," he recalled.

Harry Baer, corporate director of information systems, added, "A lot of the developed software was personality-dependent, home-grown, patched and modified. Nobody really knew exactly what was out there."

Move Toward Centralization

In 1976, IP reorganized along the lines of its business units such as packaging products, pulp, paper and oil and gas and minerals. "Our information systems were developed to support a functional organization. When the organization oriented around lines of business, it became apparent that we needed a better means of distributing information on a timely basis throughout the company," Baer explained.

That better way came in two stages.

- The first was a centralization of computing resources to an IBM 370/168 here and two 370/158s in Mobile, Ala.

Baer's corporate management information system (CMIS) department at IP headquarters in New York City planned and coordinated the changes, providing consolidated computing resources to the corporate staff and 79 IP facilities in the U.S.

- The second stage was network implementation. "When we consolidated hardware, we knew there would still be difficulty moving data to and from locations," Baer said.

"We had about 17 people in pure maintenance providing interfaces to remote locations. The company still had mainly single-application terminal types with no common standardized teleprocessing software. We needed an integrated teleprocessing network."

Jim Mayer noted, "In addition, the pressure was on to add new applications such as on-line order entry and production scheduling. It was difficult to meet those demands for new systems and worry about getting information to existing locations at the same time."

After evaluating a number of alternatives, IP opted for IBM's SNA to support the network. SNA is basically common teleprocessing software, a simplification of all the technical considerations facing a data communications user.

With SNA, all data transfer concerns such as line protocol, access method and even choice of most economical transmission are transparent to the user. For IP, this meant an IBM 3270 display station at

(Continued on Page S/20)

James Mayer and Nilsa Lopez at IBM 3270 in Operations.

CALL YOUR DISTRIBUTOR FOR THE QUIET HARD-WORKING LOW COST T-80.

ARIZONA/PHOENIX
Wyle Dist. Group/Liberty/(602)249-2232

CALIFORNIA
NORTHERN
Electronic Mktg. Specialists/(408)245-9291
Wyle Dist. Group/Elmar (415)961-3611
LOS ANGELES
Electronic Mktg. Specialists/(213)990-4244
Wyle Dist. Group/Liberty (213)322-8100
ORANGE COUNTY
Electronic Mktg. Specialists/(714)832-9920
SAN DIEGO
Electronic Mktg. Specialists/(714)560-5133
Wyle Dist. Group/Liberty/(714)565-9171

COLORADO/DENVER
Wyle Dist. Group/Elmar (303)287-9611

ILLINOIS/CHICAGO
Bexdata Ltd./(312)895-3010
Information Systems Inc./(312)671-7780

MASSACHUSETTS/BOSTON
Victor Electronics Corp./(617)481-4010

MINNESOTA/MINNEAPOLIS
Digital Systems Inc./(612)831-2474

MISSOURI
INDEPENDENCE
ESC Sales & Leasing Co./(816)254-3600
ST. LOUIS
ESC Sales & Leasing Co./(314)997-1515

TEXAS
HOUSTON
Data Applications Corp. (713)686-8413
DALLAS
Data Applications Corp. (214)231-4846
SAN ANTONIO
Data Applications Corp. (512)732-7176

WASHINGTON/SEATTLE
The Thorson Co. (206)455-9180
Wyle Dist. Group/Liberty/(206)453-8300

INTERNATIONAL DISTRIBUTORS

ARGENTINA BUENOS AIRES
Ciccone Hnos. y Lima Establecimientos
67-8036

AUSTRALIA/SIDNEY
Delairco Ind. Pty. Ltd. 29-2863

BOLIVIA/LA PAZ
Sics Ltda./55670

BRAZIL/RIO DE JANEIRO
Globus Digital S.A. 233-4977

CANADA/TORONTO
Ashworth Automation, Ltd./(416)495-0222

ITALY/ROME
Phoenix S.R.L. 802164

JAPAN/TOKYO
Marubeni Electronics, Ltd. 501-7421

KOREA/SEOUL
Oriental Computer Engineering Corp.
21-6471

NEW ZEALAND/LOWER HUTT
Computer Consultants, Ltd./66-149

SWITZERLAND/ZURICH
Kontron Electronik AG 01-628282

VENEZUELA/CARACAS
Ingedigit/31-58-93

Dataproducts

THE PRINTER COMPANY.

HAVE YOU EVER BEEN TO A SEMINAR OF EXCELLENCE?

COMPUTER/COMMUNICATION SEMINARS OF EXCELLENCE

PRESENTED BY THE
WORLD'S LEADING AUTHORITIES

1. JAMES MARTIN
LEONARD KLEINROCK
B. O. EVANS
LARRY ROBERTS
WILLIAM R. SMITH

2. LEONARD KLEINROCK

3. PETER DENNING

4. NORMAN ABRAMSON

5. DONN PARKER
BOB ABBOTT

6. LEONARD KLEINROCK
HOWARD FRANK
LARRY ROBERTS

7. CAROL ANNE OGDIN

8. ALAN KONHEIM

9. ROBERT LUCKY
PAUL GREEN

10. RUDY CYPSER
W. BERNSTEIN ■ J. ATKINS
W. FLANNAGAN ■ F. CORR

11. HOWARD FRANK
B. GOLD ■ T. BIALLY
R. KAHN ■ J. SQUARZINI JR.

12. WUSHOW CHOU

Spring 1979 3-Day Seminar Fee $595
Call or write today: (213) 476-1331

TECHNOLOGY TRANSFER INCORPORATED
P.O. BOX 49765, LOS ANGELES, CA 90049 (213) 476-1331

Packet-Switched Network Provides APL Service

(Continued from Page S/2)

[illegible]lished. It is also used as the left character of the destination selection command. The Ascii character set issue is largely avoided by the absence of special characters in messages from the network.

Former Technique

Prior to the installation of the present packet-switched network IPSA used older technology to accomplish a similar function. Some of the deficiencies of the TDM technology hastened the conversion to a packet-switched technology.

Telephone lines are a known source of transmission errors. This is particularly true when efficient modems are used. An efficient modem provides a transmission rate (measured in bit/sec) that exceeds twice the bandwidth (measured in Hz) used. Although this gives a rather efficient use of the analog voice channel, a small number of errors (perhaps 100/hour) are introduced.

With the TDM technology of several years ago most of these random errors tended to be visible to the APL user; erroneous data would be printed on the terminal or sent to APL. Some method of protecting the user from minor errors on the network trunks was required.

The usual method of compensating for short error bursts is to group several characters into a block and to append some redundant bits to the block. The receiver can then perform some arithmetic operation upon the received block, including the redundant bits, to see if a certain class of error has occurred. If the arithmetic operation in the receiver indicates an error, then the receiver requests retransmission of the block.

The Sharp network uses the same redundancy check as does High-Level Data Link Control (x*16+x*12+x*5+1 residue). This gives the ability to detect all error bursts of less than 17 bits and most bursts of greater length.

No Protection in Low-Speed Link

The network does not provide any protection on the low-speed link between the terminal and the network and in some locations this continues to be a source of error. Control of this error source requires some sort of retry protocol between the network and the terminal. Little work has been done in this area by IPSA.

Simple TDM technology dedicates one channel to every port passing over a particular trunk. The channel assignment is made at installation time. It cannot be altered without briefly removing the multiplexer from service (or, as in one extreme case, returning it to the factory).

This fixed assignment of bandwidth can impose limitations on the total number of ports in areas where digital bandwidth is not free. When the entire terminal population consisted of 134.5 bit/sec terminals of the same character length, this was not a particularly onerous restriction. It was possible to squeeze about 15 134.5 bit/sec channels into a 2,400 bit/sec high-speed trunk. The same 2,400 bit/sec can only accommodate eight 300 bit/sec channels.

During the period of transition from 134.5 bit/sec nine-unit terminals to the present 300 bit/sec 10-unit terminals, autospeed presented a further complication. It is desirable to have a single telephone number for both kinds of terminals. With simple TDM technology, it was necessary to have separate telephone numbers and separate channel groups for the two terminal classes. By using a technology without fixed bandwidth allocations, the transition from 134.5 bit/sec BCD to 300 bit/sec Ascii was eased.

Bandwidth Gamble

Packet switching has allowed a bit of gambling on bandwidth requirements. The total dial-up capacity at a remote site can be arbitrarily large. There is no *a priori* bandwidth allocation for a particular port. Bandwidth is allocated on demand exactly as CPU time and file bandwidth are allocated within APL. If an overload exists along a particular route, the symptom is a general slowdown of output.

This is quite noticeable to the APL user, as printing will occur in bursts corresponding to individual packets. This may be caused by a general overload situation such as when transatlantic traffic is running over a single trunk rather than the normal two. An alternative cause is a transient overload resulting from a trunk going out of service for a second or two.

If this happens during a peak period, a transmit queue can build up which will take several seconds to clear down to an innocuous level. Even under light load conditions, a brief service interruption on a trunk will exhaust the end-node buffer pool for a printing terminal. The resulting delay will be noticed by the user.

The location of the pause (mid-line rather than interline) is a side effect of the method of packing APL output lines into network buffers. The educated user can use the location of the printing pause to discriminate between poor performance in the APL machine and network degradation. The observed network degradation may be caused by either an acute or chronic overload. Output is held at the APL machine (or in network transmit queues).

This was considered preferable to

(Continued on Page S/22)

HAS THE
ADVANCED FEATURES
PROJECTED FOR BELL'S ACS

When Bell speaks, the world listens. Certainly the Bell System's plans for an ACS (Advanced Communications Service) have captured the attention of the entire computing/communications world. And we're glad they got your attention. Nearly every feature of the proposed ACS makes sense to us. But what makes no sense at all is the thought of anyone waiting until sometime in the 1980s to take advantage of such a service.

There's no need to wait . . . the features that make sense in ACS are already here, today . . . in TYMNET, the nation's largest packet communications network providing public service nationwide. TYMNET gives you advanced data and message services today in some 150 locations with nothing more than a local call. ACS proposes only 100 locations several years from now.

Check these features available today . . . in TYMNET, not a promised service of the next decade.

—TYMNET's Advanced Communications Technology allows users to fully interconnect unlike terminals, unlike computers, and entire networks with totally different protocols.

protocol translation, and speed matching for terminals.

—you can connect virtually any data terminal to TYMNET. (Right now more than 100 different terminal models are being used with our network.)

—more than 55 computer models from 15 manufacturers are now interfaced to TYMNET.

—

a standard feature of TYMNET since 1971.

from over 150 cities.

—TYMNET now interconnects with all international record carriers and Canada's DATAPAC, and can interface with emerging foreign national data networks.

—our OnTyme store-and-forward message switching (Electronic Mail) service has been up and running on TYMNET for more than a year.

to the network and to specific computers as well.

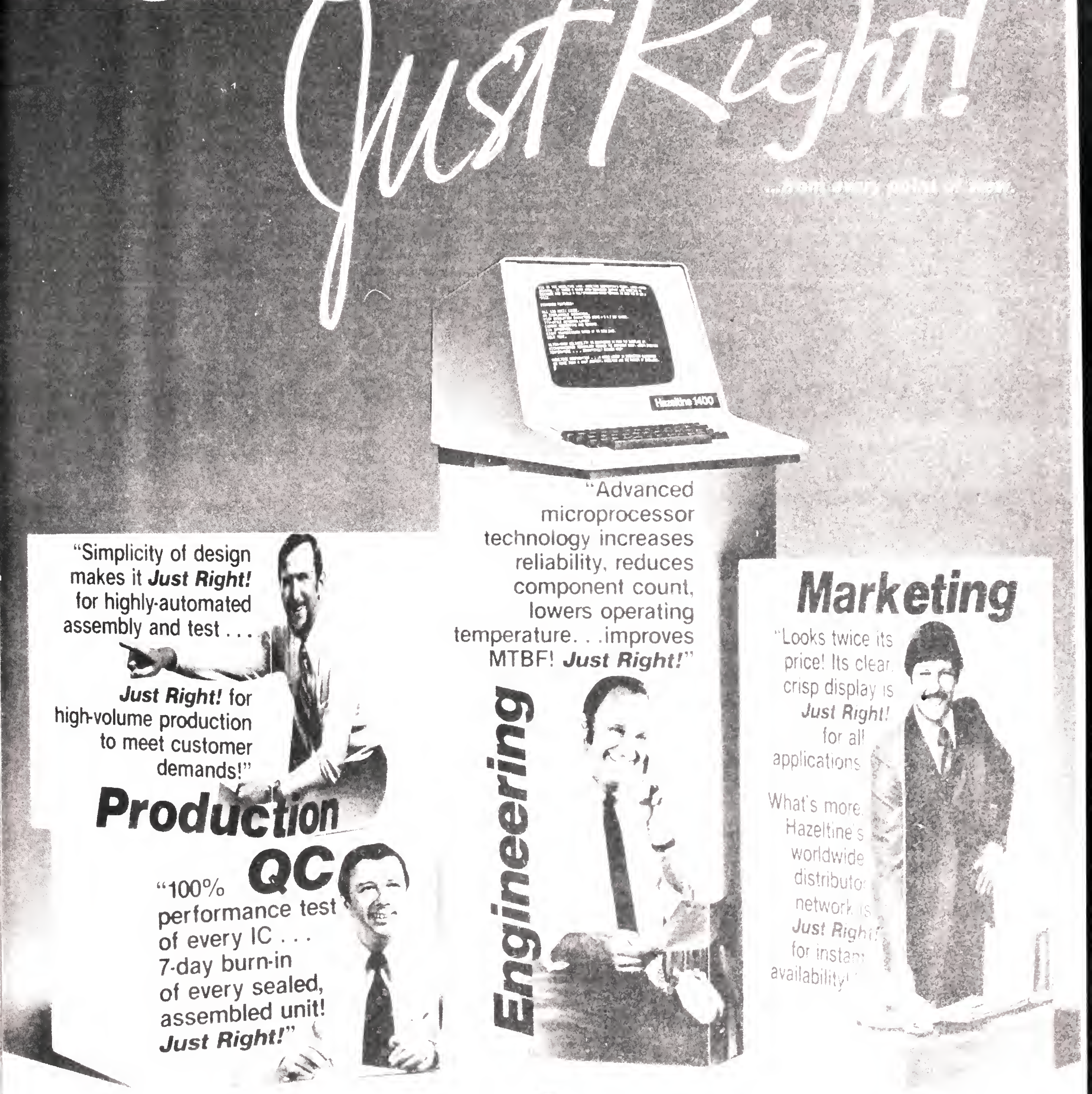
—real time status information on network nodes, lines, and host computers is monitored continually at our Network Control Center.

These TYMNET features, and then some, are in TYMNET today, the only public packet network built on more than six years of successful experience and service. TYMNET is the present common carrier network offering the advanced communications capability needed by anyone wishing to make efficient, economic linkage for computer/terminal systems.

For more information on the communications capability of the 1980s, but available right now in TYMNET, contact the Tymnet, Inc. office nearest you or Tymnet, Inc., Corporate Marketing, 20665 Valley Green Drive, Cupertino, Ca. 95014, 408/446-7000.

WESTERN REGION (408) 446-7031 CENTRAL REGION (713) 780-4455 EASTERN REGION (301) 770-5710

Hazeltine 1400



"Advanced microprocessor technology increases reliability, reduces component count, lowers operating temperature. . .improves MTBF! ***Just Right!***"

Engineering

"Simplicity of design makes it ***Just Right!*** for highly-automated assembly and test . . .

Just Right! for high-volume production to meet customer demands!"

Production

QC

"100% performance test of every IC . . . 7-day burn-in of every sealed, assembled unit! ***Just Right!***"

Marketing

"Looks twice its price! Its clear, crisp display is ***Just Right!*** for all applications.

What's more, Hazeltine's worldwide distributor network is ***Just Right!*** for instant availability!"

Hazeltine Corporation
Computer Terminal Equipment, Greenlawn, New York, U.S.A. 11740
(516) 549-8800 Telex 96-1435

New York 212/586-1970; Chicago 312/986-1414; San Francisco 415/342-6070; Atlanta 404/952-8444; Arlington 703/979-5500
Orlando 305/628-0132; Houston 713/783-1760; Dallas 214/596-2414; Los Angeles 213/553-1811; Columbus 614/451-0472
St. Paul 612/698-0801; Detroit 313/296-9510; St. Louis 618/656-7919
England 01-948-3111 Telex (851) 928572; Germany 0611-590748 Telex (841) 46924
Also available through a network of leading distributors in the U.S.A. and worldwide.

Sharp's Packet-Switch Net Provides APL Service

(Continued From Page S 20)

loss or corruption of output, and it has also influenced pricing. A 120 char/-sec terminal has a lower priority on transmission to an APL than does a conventional terminal. This may reduce the actual print speed observed at the 120 char/sec terminal to less than 120 char/sec. For this reason, imposition of a connect time surcharge on [illegible] s [illegible] nature seemed rather u[illegible]

If [illegible] bandwidth had to be assigned [illegible] dial-up port it would [illegible] to accommodate the number [illegible] demanded by the typical [illegible] branch manager. With dynamic allocation for bandwidth a relatively large number of ports can be installed at a site to accommodate peak connect loads. There is a gamble that not all ports will be continuously engaged in printing. A terminal that is not being used for output requires zero bandwidth

Packet-Switching Drawbacks

After concluding that simple TDM technology was unacceptable because of the problems mentioned above, some choices still had to be made in a packet-switched environment. Although TDM technology does have certain drawbacks, it also has certain user benefits. If all of the allocated ports are being used to print full speed, it is quite efficient. It can almost always provide very good response time.

Most data transmission systems require some extra bits which are not directly useful to the end user. For example, the asynchronous terminals used with most time-sharing systems have start, parity and stop bits associated with each character. None of these is directly useful to the end user, but they are required by the asynchronous protocol. Similarly, a TDM requires some extra bits to maintain framing synchronization.

A packet-switched system is even worse. It has a redundancy check for each block. Each block also contains addressing and sequencing information to allow it to be delivered to the proper port in sequence. With the present Sharp network packet size, about 50% of the bits transmitted are overhead bits of no direct value to the user

With a TDM, the overhead content is closer to 20%. The dynamic bandwidth allocation capability of the packet system tends to balance the higher efficiency of the TDM system. Thus, the number of 30 char./sec terminals which can be comfortably accommodated in the packet system is only slightly higher than the number for a TDM system (12 vs. eight assuming a 2,400 bit/sec trunk).

Packet-system efficiency is theoretically easy to alter. The number of overhead bits per packet is fixed for a particular protocol. By increasing the number of useful bits in a packet while preserving a constant overhead, the apparent bandwidth efficiency (useful bits divided by total bits) can be increased. Unfortunately, the need for acceptable response time constrains packet size.

The network currently uses a 256-bit maximum length packet. For a 2,400 bit/sec link, the length-sensitive term in the delay is 106 msec. Thus, the observed delay with one or more 2,400 bit/sec links in the path is rather sensitive to packet length. Doubling the packet length would change bandwidth efficiency from the present .5 to around .75 but it would also increase delay by 100- or 200-msec in certain parts of the network.

Solution to Tradeoff

A possible solution to the capacity vs. response tradeoff is to vary the packet size with the terminal speed and location. A more complex solution would be to use short packets for the first two packets of an APL response and then revert to a larger packet length.

One important design consideration in a packet-switched system is the most likely form of use. For an APL-oriented network, the expected form is point-to-point communications with relatively long holding times. A single port with a connected physical terminal is associated with a particular APL terminal task. Any interaction with other ports in the network will be via APL facilities for intertask communications, rather than through network facilities.

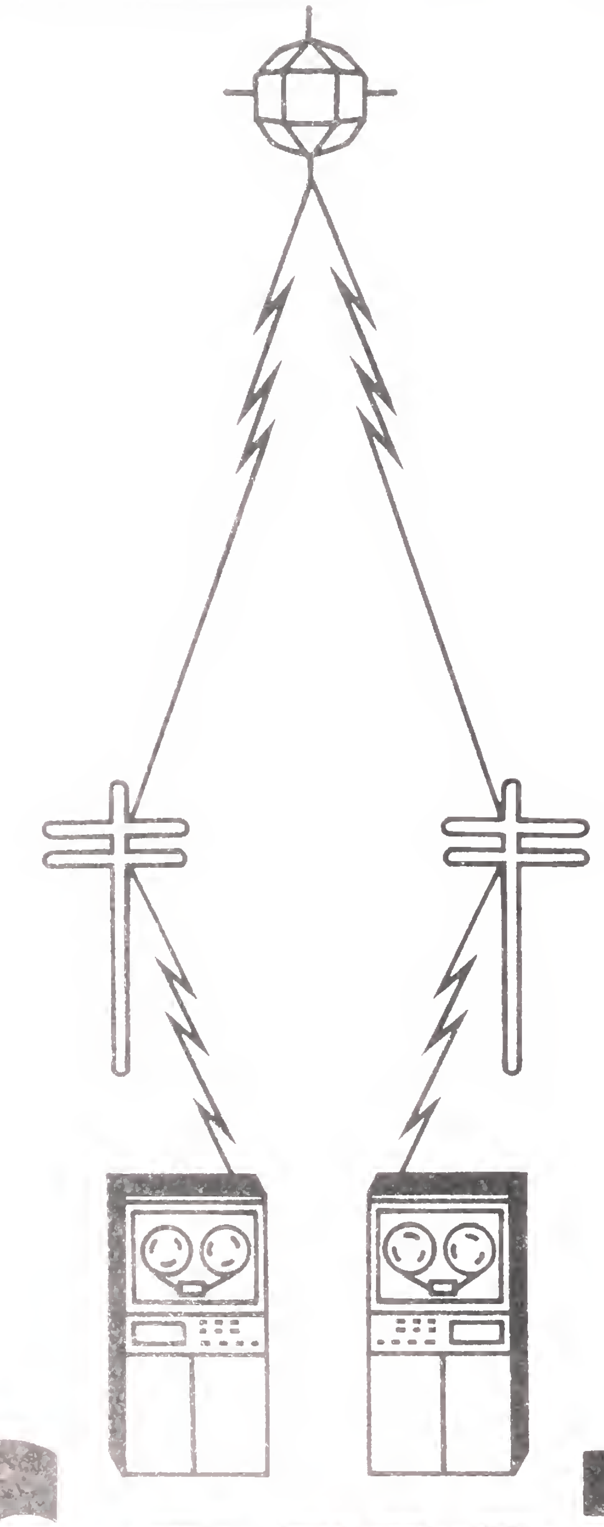
Not all computer networks have this point-to-point property. In particular, a process control system that monitors many different sensors and sends commands to many devices does not have that property.

A network with an orientation toward point-to-point communications is often referred to as a virtual call network. It resembles a switched telephone system in which physical circuits are established and held to accommodate a particular point-to-point call. Certain administrative packets are exchanged to set up a virtual call; this precedes the transmission of any data.

In the Sharp network, this occurs after the initial input line (normally "0") and before the security blot is printed. After the call has been set up, an abbreviated form of addressing can be used. This is possible because there is little need to identify the originator of a packet within a virtual call. There are only two ends to a virtual call; the end that receives a packet assumes it came from the other end.

Datagram Network

An alternative form of organization is the datagram network. In a pure da-



Whether you call it Data Communications, Teleprocessing, Distributed Intelligence Systems, Terminal-based Computing, On-line Systems, Real-time Systems or something else, does not really matter. There are certain fundamentals that are common to all of these systems

One of the biggest problems with the computer/communications industry is the lack of standardization and the use of conflicting terminology. These factors make it difficult for the beginner to come on board and can even confuse the specialist

The whole field of data communications is expanding so rapidly that few people have a chance to keep up with what is happening. All too often, day-to-day duties prevent even systems designers or communications managers from keeping fully abreast of some of these developments and their ramifications

Trevor Housley, internationally known data communications expert and author of **Data Communications and Teleprocessing Systems,** will conduct an in-depth seminar designed to fill that critical information void, presenting a detailed orientation and review of key factors, highlighting developments and their applications potential and significance

Attendees will benefit from:

A look at network design addressed with substantive suggestions for financial and performance optimization

A clear understanding of the terminology and operating concepts of data communications

A thorough grounding in the application of design theory to networks

A guide to determining whether the system on the drawing board will work and if not, how to remedy it

February 19-22, 1979
Denver, CO

February 26 -
March 1, 1979
Cherry Hill, NJ
(Philadelphia)

March 5-8, 1979
Orlando, FL

ICN
International
Computer
Negotiations.
Incorporated

For information contact International Computer Negotiations, Inc. 1331 Palmetto Avenue, Winter Park, FL 32789. Or call (305) 628-4640

Seminar
Data Communication & Teleprocessing Systems

to Low-Speed Terminals at Remote Locations

tagram network, every packet includes the name of the packet originator as well as the destination. In theory, this allows any port to conduct simultaneous dialogues with all other ports in the network. For some applications, this can be useful, but time-sharing does not seem to be one of those.

Datagrams are used within the Sharp network for certain administrative purposes such as call setup and status monitoring. It appears that these uses could be replaced with virtual calls with only moderate inconvenience.

Converting the Sharp network to a strict virtual call organization would provide certain simplifications. In particular, the amount of control information required to route datagrams is proportional to the square of the number of nodes in the network.

In a pure virtual call network, routing information need only be computed and maintained for existing rather than potential virtual calls. This reduces the quantity of routing information to the number of virtual calls times the mean path length. As the network now has around 60 nodes and is continually growing, datagram addressing is becoming rather unwieldy. Changing to a pure virtual call network appears necessary for further growth.

Another advantage of a fixed-route virtual call system is that one of the more unpleasant theoretical properties of a store-and-forward network can be eliminated. Most retransmission and queuing schemes do not provide an upper limit on packet delivery time. It is also possible in some systems for a packet to be lost without the sender being notified.

The usual approach to the lost administrative datagram problem is for the sender to wait a finite time for a response. If no response is received within the time limit, the sender assumes (perhaps incorrectly) that the original packet or the response has been lost.

Unique Call Numbers

With virtual call addressing, a unique call number is assigned to every virtual call in the system. By constraining all traffic to a point-to-point format over fixed routes, two problems can be solved. The packets for a particular virtual call will be stored in the forwarding queues of a small identifiable set of nodes. This is not true for elaborate dynamic routing systems.

When the call is completed or aborted, the packets of the call can be removed from the network. For a call that is being completed in an orderly fashion, the precaution of delaying the call completion signal until the data packets have been forwarded is adequate.

When a node or a link along the route of a virtual call fails, packets are assumed lost and the virtual call must be aborted. An abort signal is passed from both sides of the failure to the endpoints of the virtual call. As the abort signal passes along the route, it has the side effect of destroying any packets belonging to the virtual call.

The virtual call number is then available for reuse, as the previous generation of packets with the same virtual call number has been destroyed.

One other drawback to the existing scheme of routing by node number is that traffic passing between a pair of nodes reachable by independent paths is constrained to a single path. One reason for this constraint is the simple route table organization.

Within each node the route table is stored as a vector indexed by destination node. Each element of the vector gives the direction in which some other node lies.

As the current route table entries are scalars, it is impossible to encode an alternate route.

A more serious problem is the mechanism that aborts virtual calls after a link failure. It is extremely important that both endpoints of an aborted virtual call receive notification of the abnormal call termination.

When this mutual termination requirement is combined with a requirement that calls not using the failed link remain undisturbed the termination and routing algorithms impose a condition upon the route tables.

The route from A to B can be expressed as an ordered list of intermediate nodes. With the present routing algorithms a necessary and sufficient condition for mutual call termination after link failure is that the route from node A to node B must be exactly the reverse of the B to A route for all node pairs.

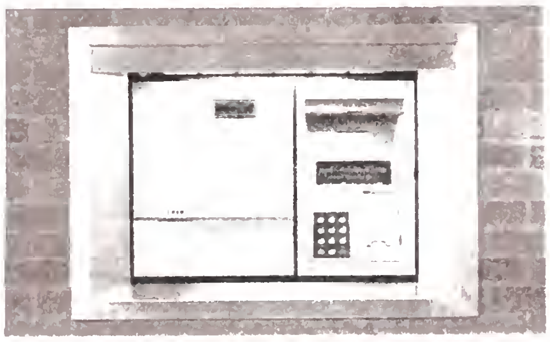
When every virtual call has its own route the consistency requirement only applies to individual virtual calls. The route from end A to end B must be the reverse of the B to A route for that virtual call. A simple forwarding validation algorithm can guarantee this in real time. Other virtual calls with identical endpoints can be routed independently.

One area of concern in the initial design was maintaining performance in the presence of minor line errors. A transatlantic link running at 7,200 bit/sec can store four or five unacknowledged packets. Some link management protocols such as X.25 require retransmission of the entire pipeline after a single error. This has the advantage of preserving packet order over a single link.

It has the drawback of exaggerating the effect of a single error. Instead of retransmitting the single corrupted packet, four or five packets may be re-

(Continued on Page S 24)

Comprehensive software capability for financial transaction systems:



SERIES 7400.

INCOTERM offers "total solution" hardware and software for financial transaction systems. Series 7400 Cash Control System is the standard software component which supports tellers, administrative and automatic teller machine devices offered as part of Series 7000. It makes comprehensive automatic data capture and teller cash control possible in branch automation. It is a first.

First . . . because it is a standard software product — a complete set of transaction, reporting, and control programs. First . . . because it's a software package that doesn't "box you in", but lets you tailor transactions to your needs in a high level language. First . . . because it's proven in on-line and off-line use by tellers, administrative officers, and branch management.

You'll find it improves teller efficiency and customer service with interactive access to account information, and improves bank operations by providing electronic journaling for paper truncation.

The Series 7400 Cash Control System not only includes the transaction routines, control programs, and reporting features necessary for full cash control; but also includes a comprehensive set of software tools for documentation maintenance, system modification, and new transaction development.

Series 7400 software — and the complete line of Series 7000 hardware — can take the risk out of branch automation. Why not get the "total solution" story? Write or call today.

More power
to your
terminal.

INCOTERM® CORPORATION
A Subsidiary of Honeywell Inc.
65 Walnut Street, Wellesley Hills, Massachusetts 02181
Telephone: (617) 237-2100

Packet-Switched Network Serves Users of APL

(Continued from Page S-23)

transmitted. The Sharp network retransmits only the corrupted packet. This has the drawback of permuting the packet order along the link.

If the various packets in the pipeline were associated with independent virtual calls, this would be of no consequence. The order within a virtual call could be disturbed by retransmission. In a network which uses multiple routing, differing transmission delays along distinct paths can give the same effect. The possible ill effects of order loss are avoided by including an interend sequence number in every packet belonging to a virtual call. The receiving endpoint can then process the packets in the order in which they were emitted rather than the order in which they are received.

APL Interface

The network would be of little value without a connection to the APL machine. Several methods of connection were discussed during network design. An obvious solution would be to preserve the symmetric hardware of a TDM system. At the data center end, data from a single virtual call would materialize on a physical port attached to the network. This physical port would be electrically connected to a Memorex Corp. 1270 terminal controller.

This solution is sometimes called low-speed demultiplexing. It is simple in concept and appears exactly as an ordinary 1270 configuration to APL.

In addition to the obvious problem of requiring large quantities of hardware, low-speed demultiplexing has other drawbacks. The worst is the way in which the entire system is slaved to a 300 Hz oscillator in the terminal controller. Data transfer to and from APL is constrained to a single procrustean speed. There are situations where transfer at a rate which is either faster or slower than the normal terminal speed is desirable.

Running the traffic into the APL machine on a single high-speed line and demultiplexing within the APL machine was contemplated. This was rejected mainly because of the excessive changes which would have been required in the APL software.

The solution which is in use now involves placing a stored program processor between the APL machine and the network. This is a true front-end computer as it is attached directly to a 360-byte multiplexer channel. On the channel side, it looks very much like a Memorex Corp. 1270 or an IBM 2703. Every virtual call uses a separate address on the byte multiplexer channel. The front-end computer can trivially adjust the rate at which data is transferred from APL to the network. This adjustable rate is fairly important in achieving acceptable response time.

When APL starts generating output in response to an input, all of the network buffers for that virtual call are empty. In this situation, data is transferred at high speed over the byte multiplexer channel to fill an initial buffer ration. Data transfer for that virtual call then stops until a buffer has been sent to the terminal.

Another buffer is then filled with data from APL and sent through the network.

This process occurs outside of APL and is not usually visible. The network buffers are independent of APL buffer size and APL output line boundaries.

If the network can absorb output faster than APL is generating it, a partial buffer will be sent. A typical case is the SENT response to)MSG. When APL is generating output more rapidly than the network is willing to accept it, the normal APL mechanism for suspending an output-limited task is used.

Flow control is also useful on input to APL. Sharp APL has retained the 1969 APL/360 scheme of demand assignment of input buffers. The default assumption in APL is that an input line will be quite short. If an input line is longer than expected, extra buffers will be assigned within APL.

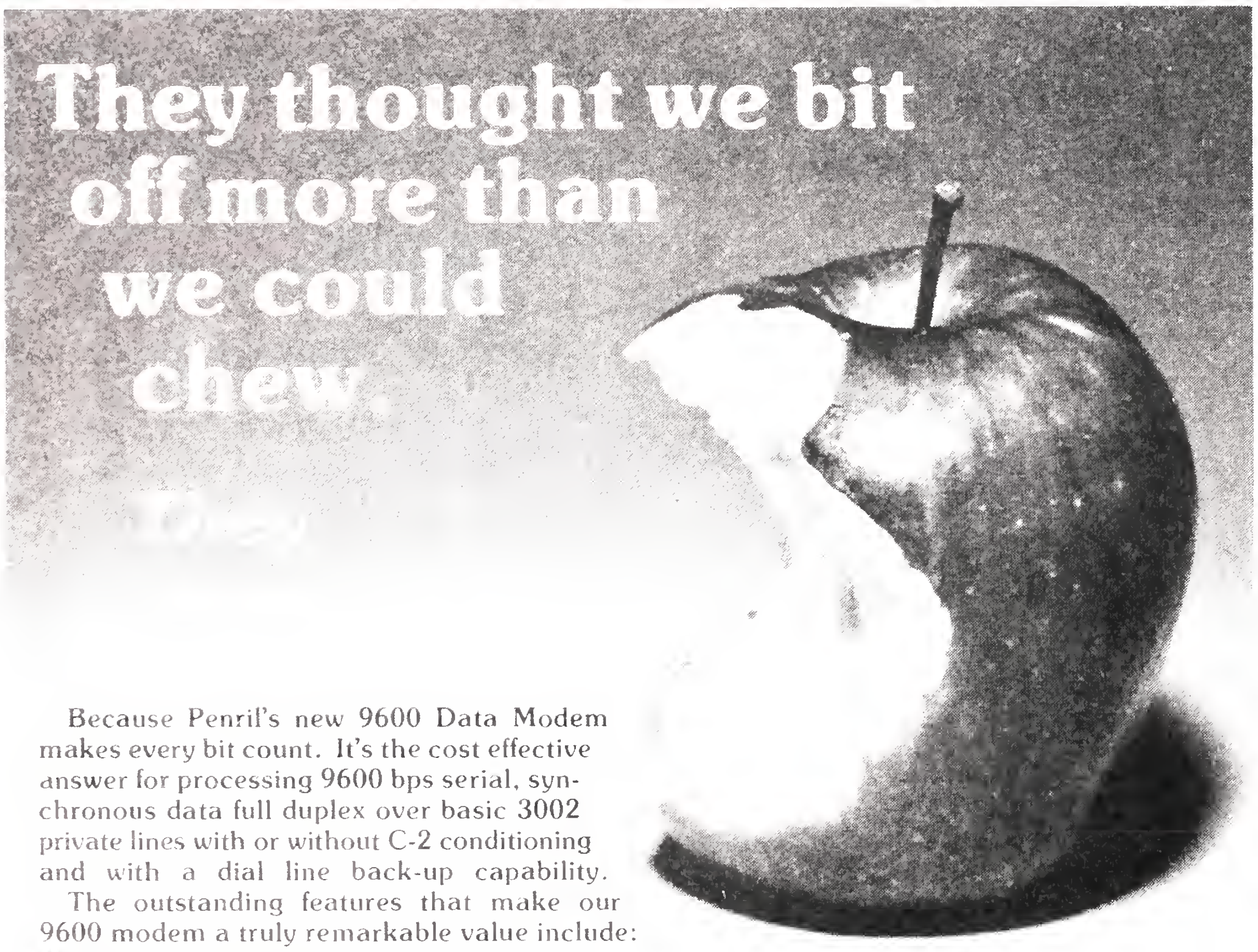
It is theoretically possible for the network to present data faster than APL can allocate buffers. To avoid loss of keyboard input, a method of regulating the rate at which the front-end computer presents data to APL was required. This was accomplished by sending an explicit end-of-buffer signal from APL to the front-end computer whenever an APL buffer is filled.

The front-end computer suspends data transfer for the affected virtual call until the APL machine signals that a new input buffer is ready. This signalling is normally effected by command chaining on the byte multiplexer channel and thus takes less than 60 microsec.

If intervention by APL software is required to allocate a new buffer, the "buffer ready" signal may be delayed for an arbitrary period. The data is held in the front-end computer until the "buffer ready" signal is received from APL. This solution avoided the potential embarrassment of carefully forwarding (and perhaps retransmitting) a packet over the ocean, and then corrupting it with a race condition in the computer room.

Establishment of a new call is another area where a front-end computer was useful. The number of ports in the network somewhat exceeds the number of T-tasks which can be simultaneously supported with the present IPSA hardware configuration. This makes dynamic allocation of byte multiplexer channel addresses desirable.

(Continued on Page S/31)



Because Penril's new 9600 Data Modem makes every bit count. It's the cost effective answer for processing 9600 bps serial, synchronous data full duplex over basic 3002 private lines with or without C-2 conditioning and with a dial line back-up capability.

The outstanding features that make our 9600 modem a truly remarkable value include: **Multiport Capability** with selection of five different multiplexer configurations. **Integrated Diagnostics** to evaluate system performance and isolate problem areas. **All Digital Design** employing LSI chips for superior performance even over marginal lines. **Improved Timing** and synchronization with versatile training sequences. **Modular Construction** with plug-in circuit cards and complete front panel controls/indicators. Additionally, our 9600 has the traditional quality and reliability that makes all Penril modems a dependable part of your data communications network.

make every bit count.

call your nearest Penril sales representative and ask him about our new 9600 Data Modem.

Penril Corp.

DATA COMMUNICATIONS DIVISION
5520 RANDOLPH ROAD
ROCKVILLE, MARYLAND 20852
(301) 881-8151 • TWX 710-828-0522

Look closely.
Very closely at our new Model 85 remote information system.
How many functions do you see?
DATA 100
DATA 100

Look again.

Is our expanded Model 85 system in your future?

Take this quick quiz:

(WARNING: there may be more than one right answer to each question.)

1. Model 85 is:
- (a) a remote information system we first introduced in 1978.
- (b) a distributed data processing product.
- (c) a multifunction data processing product.

2. Its features include:
- (a) multitasking for up to four applications.
- (b) large disk capacity.
- (c) modular configuration.
- (d) more than these.

3. New improvements are:
- (a) increased processor memory to 256K bytes.
- (b) the addition of remote workstations and printers.
- (c) increased disk storage to 100 MB.

4. Model 85 functions are:
- (a) remote file management and high level language processing.
- (b) on-line file management and stand-alone processing.
- (c) batch communications and volume data entry.

5. Available languages are:
- (a) RPG II.
- (b) COBOL.
- (c) ESPERANTO.

6. Model 85 saves users money as an alternative to:
- (a) enlarging mainframes overburdened by network interactive applications.
- (b) adding communications lines with greater capacities.
- (c) maintaining a mainframe configuration only fully used at peak time periods.
- (d) losing time and money due to mainframe downtime.

7. For more details on Model 85, you should:
- (a) phone your nearest Data 100 sales office or one of the numbers we've listed.

Now check your answers.

All answers [illegible]

[illegible]

DATA 100
CORPORATION

[illegible]

LOS ANGELES 213/645-4500 • SAN FRANCISCO 415/546-6000 • CHICAGO 312/992-08[illegible] • BOSTON [illegible] • DETROIT [illegible] •
MINNEAPOLIS 612/932-8000 • NEW YORK 212/867-6200 • PITTSBURGH 412/[illegible] • HOUSTON [illegible] • WASHINGTON [illegible] •
WOODBRIDGE N.J. 201/634-7800 • ATLANTA 404/455-3895 • ST. LOUIS 314/878-[illegible] • TORONTO [illegible] • MONTREAL [illegible] •
LONDON ENGLAND (0582) 763161 • MELBOURNE AUSTRALIA (03) 267-55[illegible] • FRANKFURT GERMANY [illegible] • [illegible]

Integrated Net Lets Firm Save $600,000/Year

(Continued from Page S/19)

[illegible] almost any terminal [illegible] could be used for [illegible] with the computer [illegible] person could log onto [illegible] switch over to [illegible] and wind up [illegible] administrative message — all in one session at one terminal.

"The SNA concept lets us design applications as if the entire company were under one roof," Mayer said. "Any terminal can communicate with the mainframe or any other terminal — for more than one application."

With the help of SNA, the net has helpled IP achieve a number of business objectives, including major cost reductions.

"Annual savings are now estimated at $595,000," stated Mayer. "The original forecast was about $240,000. These are direct cost reductions in hardware and lines.

"In addition, new applications go on the same terminals. There's no need to add equipment. That's a cost-avoidance not even included in the $595,000," he added.

Commenting on the three-day business close, Harry Baer said, "We used to prepare directors' statements on the 17th workday after month end. Management wanted financial results sooner. Working closely with the company controllers, we implemented new systems tied into the network and now we get directors' statements by the sixth workday and earnings information the afternoon of the third.

"That's financial information from 114 locations worldwide. We could not have achieved that without the teleprocessing network," he noted.

Reports More Accurate

Another benefit has been a better handle on transportation services. IP is one of the largest users of transportation in the U.S.

Before the network, information on traffic movements was mailed from about 20 key locations to headquarters, then batched for data entry, correction and relay back to locations. Reports often arrived too late to do any good.

But now, the company has a more up-to-date base on movements and more timely and accurate reports. "The whole reporting system has improved," Baer stated.

A major use of the system has been on-line order entry for the company's primary pulp and paper products. Salesmen can enter an order in the sales office, check stock availability at a mill, process the order and get shipment feedback information all at one display terminal.

Marketing data is stored on one regional mainframe, manufacturing data on the other.

Data flows freely from one 370 to the other and between terminals. As far as the user is concerned, all applications related to order entry are tied together.

"It has improved customer service," Baer said. "Our people respond to inquiries faster, we get information to the mills faster and we put manufacturing schedules together quicker.

Before, retransmission of data and enormous clerical effort resulted in roughly a one-in-five error rate in order entry. Now the error rate is insignificant, much less than 1%, even though the number of transactions a day has nearly tripled," he added.

Another plus to the network and SNA has been a productive reversal of IP's trend toward centralization — via distributed processing. The company has already offloaded some processing to remote sites. Eighteen IBM 3790 distributed processing systems have been installed at one division's plant locations, with a total of 30 expected by the end of 1978.

Instead of processing all data at regional data centers, plants do remote editing on 3790s for roll stock inventory, general ledger, accounts payable and other financial applications. The host 370/168 here provides major customer and item file data and network support.

"SNA lets us integrate distributed processing into the teleprocessing network," Mayer said. "In fact, the concept lets you interface any IBM SNA

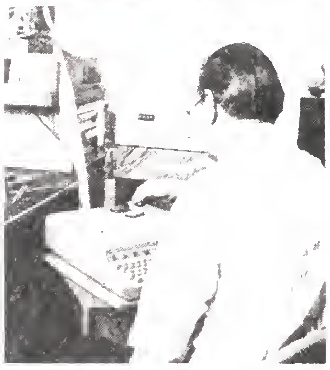
(Continued on Page S/27)

The *Portable* Cost Saver.

for newspaper reporters

for field diagnostics

for sales representatives


for programmers

CDI has conceived the smartest move yet for terminal users . . . the Miniterm 1205 *Portable* ASR!

Incredibly in one compact package the 1205 offers a portable, micro-processor-based terminal with removable storage media and off-line editing capabilities that rival some of the most sophisticated word-processing systems.

Users can now rely on a small, rugged terminal that packs a quiet printer with *both* an integral 8K Random Access Memory and a built-in Mini-Cassette tape unit with up to 68,000 characters of removable storage

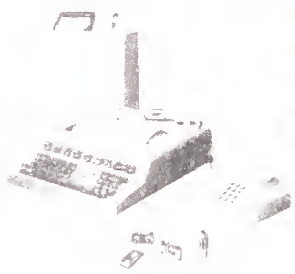
And when it comes to great moves . . . a salesman, programmer, field technician or journalist can go anywhere, plug the Miniterm 1205 ASR into an ordinary wall outlet, and communicate with any popular CPU via the built-in acoustic coupler.

Because you can prepare, edit and format data off-line where it is generated, and you no longer must store programs in an expensive, time-sharing medium, you can substantially reduce both telephone line charges and program storage costs. In fact, in some cases, Miniterm 1205 ASR's can pay for themselves with savings better than three-to-four times the monthly rental charge

Get the flexibility — plus real savings — that only CDI offers. The Miniterm 1205 Portable ASR. Make it your smartest move yet.

The most versatile portable ever offered!

- Built-in Mini-Cassette tape transport with removable storage of 68,000 characters per Mini-Cassette
- Integral 8K Random Access Memory, expandable to 32K, with powerful high-speed editing capability
- Quiet, buffered, 50 CPS thermal printer
- Unique, three-mode keyboard (APL optional)
- Built-in Acoustic Coupler
- Portable Carrying Case



COMPUTER
DEVICES INC.
25 North Avenue
Burlington, Ma. 01803
(617) 273-1550

SALES AND MAINTENANCE OFFICES THROUGHOUT THE U.S. AND CANADA

For additional product literature and a demonstration at your convenience, use this handy coupon. Today.

NAME
TITLE
COMPANY
ADDRESS
CITY
STATE
ZIP
PHONE
COMPUTER SYSTEM

COMPUTER
DEVICES INC
25 North Avenue
Burlington, Ma. 01803
(617) 273-1550

Dutch Bank to Implement X.25-Based Network

(Continued from Page S/18)

the applications users that the network is closing. The service communications facilities also permit control of terminal test programs from the central location.

Network Control

The services provided by Comsys to operating and supervisory personnel — the staff users — were designed to permit efficient day-to-day management of the network. The complete network can be controlled, configured, monitored and tested from the central location. As noted earlier, the staff user is provided with comprehensive statistics gathering and logging facilities and with the means for communicating with subscribers.

The central network control facility lets staff users perform the functions required for operational control, configuration control, failure handling, collection of quantitative information about the normal operation of the system, chronological surveys of certain system activities and information on error situations.

A duplicated network control data base is maintained at the control center, containing a complete record of the current identification, status and interrelationships of all network components and users.

Each entity in the data base is defined in terms of several attributes. A staff user, for example, is identified by a password and a function key which specifies the system functions to which he has access, a subregion in the network structure is defined in the data base in terms of its internal and external identification, address, activity state and so on.

Control Commands

The network controller has an extensive set of configuration control commands with which new entities or attributes can be entered and existing ones [illegible] deleted. Complete [illegible] control of the network may thus be exercised from the central location without the need for [illegible] procedures.

The first Comsys installation is dedicated to banking, but in the opinion of the Amro Bank the system is suitable for application to a wide range of data communications requirements in commerce, industry and government. The standard interfaces and modular [illegible] layered internal structure of the system permit adaptation to different environments with a wide variety of functional and performance requirements.

[illegible] Bank [illegible] the Netherlands.

Net Brings Big Savings

(Continued from Page S/26)

terminals to the network. There are no teleprocessing facilities at IP not part of the system at this time."

That includes about 50 IBM 3770 terminals used for message switching of administrative traffic such as reservations. With the 3770, IP has removed the last vestige of its paper-tape teletype writer network.

Any IBM Terminal

The network permits message traffic on any IBM terminal. For those locations without such a terminal, IP has replaced teletypewriters with the 3770 teletypewriters. Some 160 teletypewriters have been eliminated. The network now has 160 3270 CRTs.

One of the surprising results of IP's integrated network is consistent response time of three to six seconds. Despite growing volumes, the company has managed its system resources most effectively.

Has the effort to integrate computer functions at IP been worthwhile? The network has cut direct costs almost $600,000 a year, and because new applications can run on existing equipment, there is built-in cost avoidance.

At a time when information becomes one of a corporation's most valuable resources, IP has determined how much of that resource it needs and is finding ways to use it effectively.

Dear Ma:

How come Racal-Vadic can build a 1200 bps full duplex acoustic coupled modem and you can't?

When Racal-Vadic invented the VA3400 way back in 1973, they purposely chose to transmit data in the originate mode at 2250 Hz and receive data at 1150 Hz. They were really thinking ahead, Ma, because these frequencies place 2nd harmonic distortion (created by non-linearity in the telephone microphone) at 4500 Hz — well away from the coupler's received signal.

This wise choice of frequencies has made possible a 1200 bps full duplex acoustic coupler—the VA3434, which is now in full production at Racal-Vadic!

Why in the world, Ma, did you reverse the frequencies in your 212A? By transmitting at 1200 Hz and receiving at 2400 Hz, the 2nd harmonic of your transmitted signal falls right in the middle of the received signal, making the design of an acoustic coupled 212A an engineer's nightmare.

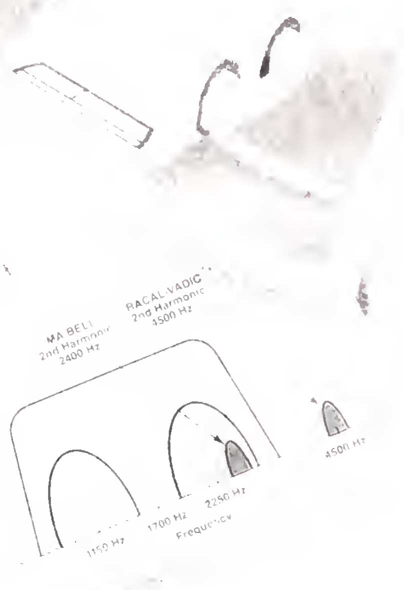
So Racal-Vadic has done it again, Ma. The real winners are remote terminal users who no longer have to settle for 300 bps operation. Now, merely by replacing their present coupler with the VA3434, they can operate at 1200 bps full duplex, while retaining the portability that an acoustic coupler provides.

Suggest that you phone or write Racal-Vadic today, Ma, for all the info on the VA3434 1200 bps full duplex acoustic coupler.

Your independent thinking son,

Alexander Graham Jr.

PS: Racal-Vadic has shipped over 175,000 modems to date.



Racal-Vadic the new name for **vadic**

222 Caspian Drive, Sunnyvale, CA 94086 • Tel. (408) 744-0810 • TWX 910 339-9297

RACAL
The Electronics Group

Distributed Net Helps French Bank Grow . . .

(Continued From Page S-3)

ing administrative core.

- At the top of the hierarchy is the Paris DP center.
- At the next level performing about 30% of the daily batch processing and acting as backup for the Paris center, is the Aix-en-Provence DP center.
- At the next level are over 200 regional centers, which operate like small banks with a number of branches under them. Because bank management did not want to impose a reorganization of the banking structure on top of a DP system change, the distributed system was designed to have a remote processor at each region.
- Each region, in turn, serves an average of about 10 branches, each of which has a terminal controller and an average of about five terminals for a total of 10,000 terminals in the system. The terminals are nonintelligent CRT-type units with printers attached. Application and control logic resides in terminal controllers for first-level control and in regional processors for secondary control.

Terminals are on-line to the regional processors via controllers. During the working day, tellers use the terminals to verify account balances, record deposits and withdrawals, perform end-of-day balancing and so on.

Selected information for each customer served by a branch is stored on disk at the regional level. During the day, these records are updated online and the same transaction forwarded to Paris or Aix.

Complete Customer File

The complete customer file, located in Paris and Aix, includes account history and full description of banking products used by each customer. The average record length is 1,500 bytes. During the day, this file is accessible by all terminals.

In addition to these inquiries, some updating of specific centralized files is done directly from branch terminals. About one half of total updating transactions come from outside sources — other banks, clearing houses and so on.

All official updating is done by the center systems, at night, on a batch basis. After completion of updates, updated records are transmitted back to the regions.

Interregion Transactions

About 10% of transactions originating within the regions apply to records stored at other regions. These interregional transactions are automatically transmitted to the appropriate regions. As a result, a customer from the south of France can easily cash a check at a branch in northern France.

Reliability and backup within the system have been given high priority by the bank. If a regional processor is down, switches can be thrown to reroute transactions to either Paris or Aix, so these central sites provide backup for the regions.

A terminal controller in a branch could go down, disabling all terminals at the branch. To secure against this possibility, it would be necessary to install dual controllers at the branches, but because of economic reasons and a statistical study (of hardware reliability), this has been left undone for the present.

Designed for Expansion

However, the system has been designed for expansion and these dual controllers are included in future plans. The bank does not think this a problem area because of the controller's simple structure.

Since the regional centers and branches do not need computer operators, Societe Generale is able to significantly lower costs. This has resulted in equipment savings, too, by allowing the utilization of equipment that can operate in an unattended mode.

No local programming capability is provided for the regional processors; programs are controlled and loaded from the central sites. With more than 200 regional processors, an operations and programming staff for each could create a huge expense.

The bank checked carefully into the feasibility of this type of operation before finally deciding on the distributed approach.

Improved service to cus-

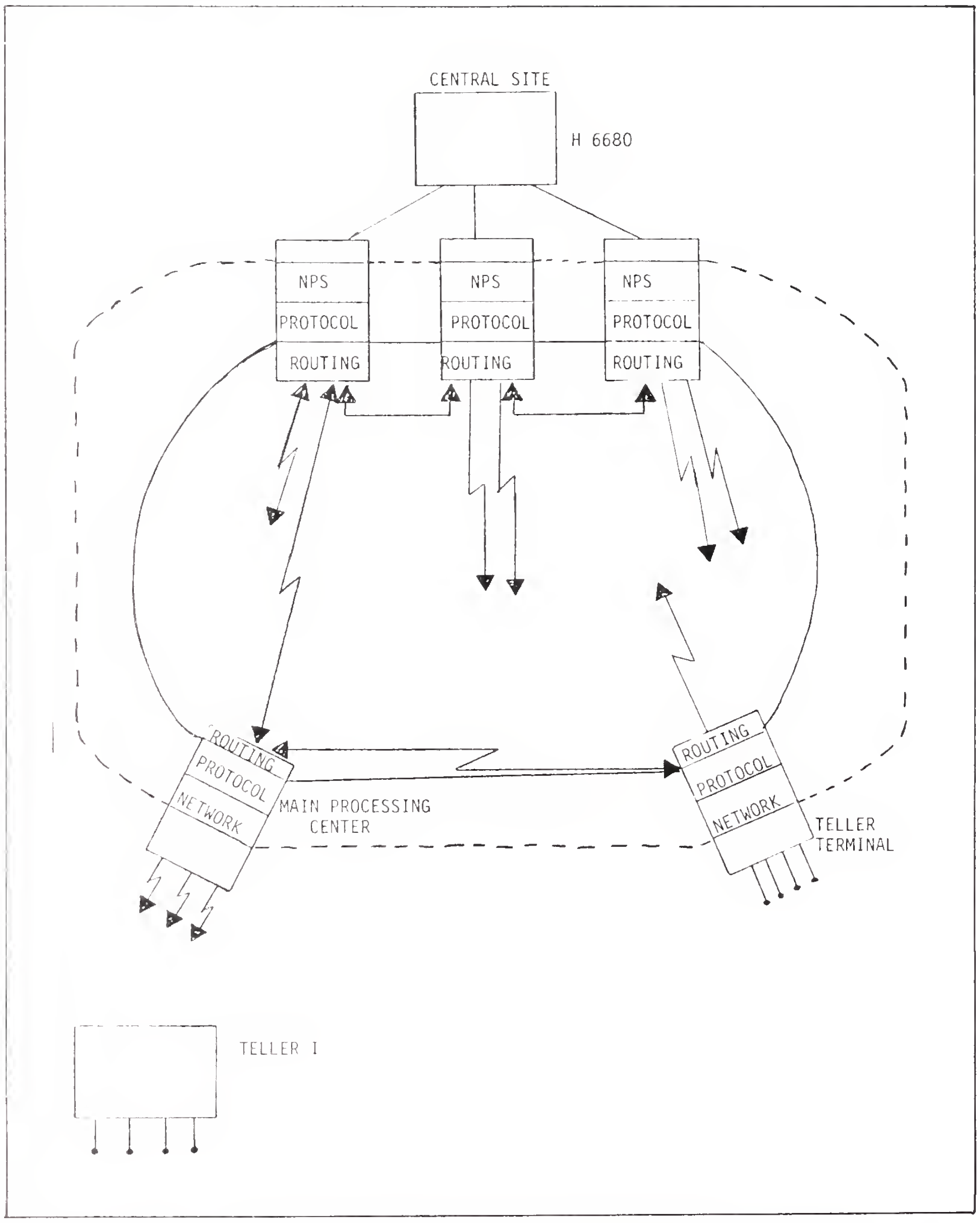


Figure 2. Societe Generale Structural Interface

3270 & X.25 NOW

CTX 9100 Series
Network Interface Processors
with Unique DMEP Front End
Communications Controller Software

the only one of its kind

- 9100's allow you to use binary synchronous (BSC) 3270 terminals on X.25 networks
- 9100's allow individual 3270 screens to select applications in any host computer (even without an X.25 network)
- 9100's allow you to concentrate 3270's for transmission over satellite circuits or private lines
- 9100's offer superior network control, including remote diagnostics and statistics, from a central site
- DMEP supports X.25 for IBM host computers and the 9100 and offers most SNA and VTAM features with current non-VTAM software
- DMEP and 9100's require no modification to existing software or hardware configurations
- Two models
  - 9101 — 3 BSC input lines, 1 X.25 output line at speeds up to 9.6 KB
  - 9102 — Up to 44 input lines, multiple X.25 output lines at speeds up to 56 KB

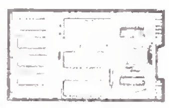
DMEP and 9100's can achieve significant reductions in communications line costs while providing additional capabilities to your existing BSC terminal systems. Call or write CTX and find out how you can use 9100's to improve your data communications.

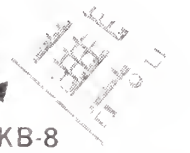
CTX
Cambridge Telecommunications, Inc.
5 Old Concord Road, Burlington, MA 01803
(617) 273-0980

LET CUSTOM TERMINALS CORP.
POINT YOU TO THE SOLUTION.

Now—a proven source for **custom-designed terminals and peripherals**—Application Engineered.
Don't compromise! CUSTOM TERMINALS will build to your exact specifications—at low-cost, and in any quantities —Terminals that will run reliably in your: • shop • secure areas • office • factory • mines • loading dock. • etc.
All products connect to any host CPU in a polled or multi-drop configuration

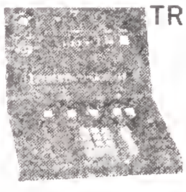
optional micro-based local intelligence





KB-8
Numeric Pad add-on for all peripherals and terminals. Interfaces with all CRT's and printers (Customizable keyboards)

TR-10
Low cost, reliable factory floor type data entry terminal . . . Available with badge readers, journal printers, customizable keyboards, and displays, etc.



TR/B
Special purpose multi display data entry terminal . . . Used with mini computerized conveyor systems, etc

CUSTOM TERMINALS CORP.
A SUBSIDIARY OF COMPUTER HORIZONS CORP
225 OSER AVENUE HAUPPAUGE, N.Y. 11787 · (516) 231-3111

. . . By Coordinating Services at 2,600 Branches

tomers, improved conditions for decision-making, defragmentation of work in branches and reduction in teller's administrative tasks were the main objectives in automating the bank's teller system.

Before SG2 could design a fully integrated teleprocessing system, however, its researchers had to analyze Societe Generale to determine type, quantity and flow of the data to be processed; geographic location of data input points; response time required by conversational data; potential security problems; and role of input points not involving system personnel.

These objectives were constantly related to the bank's aim to upgrade customer services, facilitate decision-making, centralize the system's functions and reduce the time spent on administrative routine.

Three main objectives were defined in the management information system plan: The system:

- Must simplify data acquisition by reducing the codification by the terminal's data input screen masks and through direct gathering of data on terminals, thereby avoiding transcriptions used in batch processing.
- Must provide instantaneous access to files giving only the desired data.
- Must be automated, using point-of-sale (POS) terminals at the customer's offices and automatic teller machines for such things as funds transfer, bill remittance and stock exchange.

Network Design

The bank's redesigned data network is comprised of two day-processing centers (Paris and Aix-en-Provence) equipped with two mainframes (dual Honeywell, Inc. H66/80 processors) linked by a high-speed 56K bit/sec line and 2,000 Intertechnique controllers linking CRT terminals from Sintra, Logabax and other suppliers.

The number of terminals will soon be increased to 10,000 units.

The design of the on-line teleprocessing network system closely copies the management structure of the bank in order to perpetuate the decision-making centers and to allow the system to adapt to local operational demands.

By keeping the teleprocessing system congruent with the decision-making structure, SG2 ensured that the appropriate information would be available to the administrators who need it.

Two types of data bases, one at the main centers and the other at the local levels, manage all customer accounts. The data bases are comprised of information relative to each customer and enable Societe Generale to handle 2.7 million customers, four million accounts, and two million daily transactions.

In operational terms, the redesigned system allows branches to work independently of the DP center and in real time for 80% of their operations. The response time is very short and the system filters out unessential and improperly prepared data from the master terminals.

In concrete terms, the redesigned system, called RTA, enables Societe Generale to handle two million transactions per day at 100 transactions per second. It allows local terminals to handle all usual transactions and incorporate keyboard and display screen equipment.

The number of workstations at a local branch can be varied, with one terminal controller used for every four CRTs.

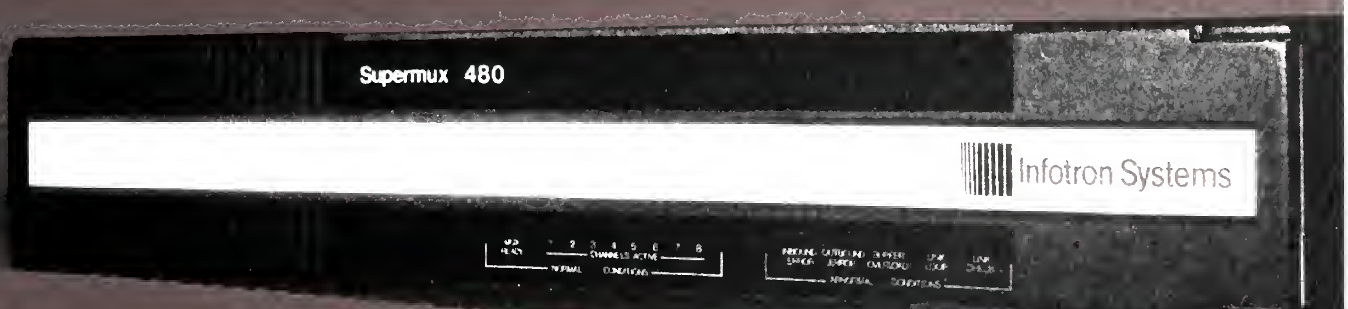
The system can also be linked with other types of terminal equipment, such as automatic bank note dispensers.

At the main DP centers, the H66/80 dual-processor CPUs have 1,024K words of memory and are front-ended with a Datanet, Inc. 355 with 64K bytes of storage. The regional processors are Honeywell Bull H716s with 64K words. These processors interface with the controller terminals on the local level.

To ensure the security of the system, an automatic surveillance system and decentralized control were implemented.

Sam Bylander is administrative assistant with SG2 at Suite 1175, 8350 N. Central Expressway, Dallas, Texas 75206.

Super Smart...Super Cheap



A Statistical Multiplexer for Only $1500

A four channel statistical multiplexer for only $1500, an eight channel unit for only $2500! Super prices with super performance—error-free data, double or better the throughput, down-line loading and built-in diagnostics.

Super smart Supermux 480's replace up to eight transmission lines with just one. Bandwidth is assigned dynamically without wasting any on idle terminals—double or better the throughput of dumb TDM's.

Transmission errors are eliminated too! Data is buffered, checked and, if necessary, retransmitted, all completely transparent to existing terminals and software. With Supermux, not a bit of data is lost, even with outages lasting ten seconds or more on a fully loaded 9600 bps line.

Microprocessor-controlled Supermux 480's mix dial-up and dedicated asynchronous inputs at speeds up to 9600 bps. Super features—built-in diagnostics, system status reporting, as well as reconfiguration of remote, unattended units—all standard.
Super Smart . . . Super Cheap . . . Supermux 480.

Infotron Systems Corporation
Cherry Hill Industrial Center, Cherry Hill, NJ 08003
800-257-8352 609-424-9400

In Europe: Infotron Systems Ltd.
Systems House, Poundbury Road
Dorchester, Dorset DT1 2PG England
Telephone: Dorchester (0305) 66016 Telex: 417276

Infotron Systems
First in Performance and Reliability

Ties Terminals Nationwide

CRT Response Time Slashed Via Satellite Link

Special to CW

NEWTON, Mass. – American Fabrics, a wholesaler and importer of drapery, upholstery and decorator fabrics headquartered here provides same-day order shipping services to its customers throughout the country. In order to facilitate that rapid service, American Fabrics depends on what management information systems director Maurice G. Parent calls "a totally interactive business management system."

More than 60,000 transactions per day are entered into American Fabrics' central IBM 370/148 in Massachusetts via sophisticated and efficient telecommunications systems linking the host CPU with interactive CRT terminals and output devices located in major metropolitan areas across the country.

The Los Angeles regional distribution center alone accounts for approximately 15,000 transactions daily.

A Matter of Pride

"We have 16 interactive CRTs in Los Angeles which are used primarily for on-line order entry," Parent said. "That data affects all aspects of our business — inventory, back orders, shipping, accounts receivable and purchasing.

"American Fabrics prides itself on the fact that we can receive an order, process it and update all the necessary files here at the central facility and then output shipping documents at the regional center and have the order ready to go to the customer in less than two hours. Response time is absolutely critical."

By implementing a PIX-II "virtual data link" data communications system from Paradyne Corp. of Largo, Fla., American Fabrics cut CRT response time at its Los Angeles offices from 10 or 12 seconds to less than five, according to Parent.

The PIX-II is a minicomputer-based system that allows IBM 360/370 users to reduce communications costs by linking multiple remote devices to a central host CPU over a single land-based or satellite communications line and to implement Synchronous Data Link Control (SDLC) protocol without teleprocessing software overhead on the mainframe.

The PIX-II system consists of a local control unit (LCU), which attaches to the byte multiplexer channel of the host, and remote control units (RCU) in dispersed sites that can support multiple IBM, IBM-compatible and/or Paradyne devices such as interactive CRT terminals, printers, card readers and tape drives.

All data communications functions are transparent to both the host and remote users and remote devices function virtually in a local mode.

"The Paradyne system was implemented in November to replace a Comten, Inc. 3650 multiline concentrator, utilizing IBM's Network Control Program/VS and Btam software, which previously supported a bisynchronous satellite link to 16 CRTs and two printers in Los Angeles," Parent said.

"Since then we have recognized several important benefits from the system. First, PIX-II operates on an attention-interrupt basis. That is, the CRTs communicate with the mainframe only when they have data to send. The elimination of time-consuming polling procedures has been a huge factor in improving our response time.

"Secondly, by improving our response time, we have been able to achieve better remote printer utilization.

"Third, the Paradyne system allowed us to implement bidirectional data transmission using SDLC without all the grief usually associated with other vendors' SDLC.

"Fourth, we have a mixed communications and systems software environment, and the transparency of the PIX-II system means it can perform its functions efficiently without impacting other systems," he added.

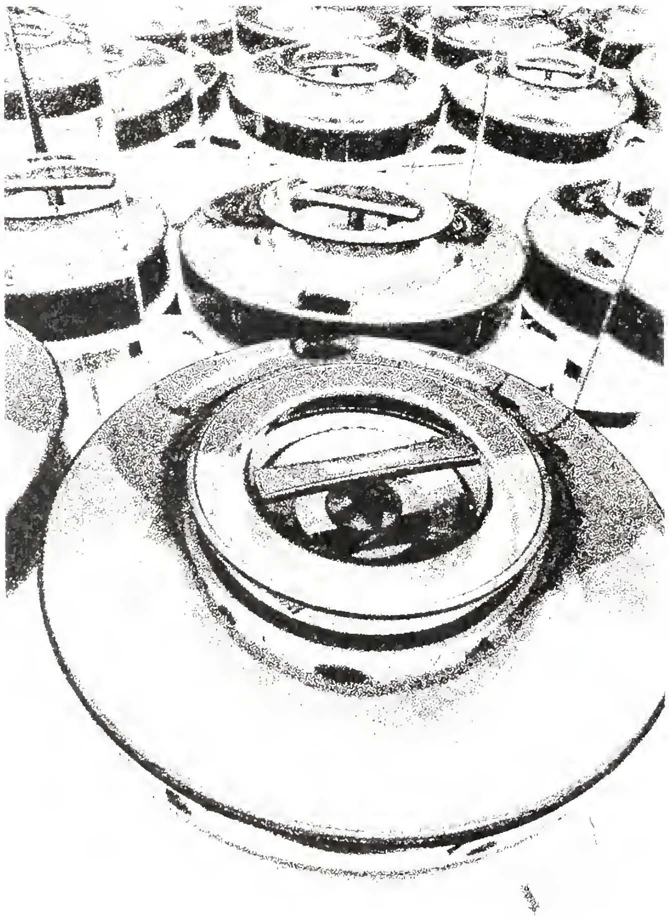
The PIX-II configuration now in use at American Fabrics includes an LCU attached to a 2M-byte IBM 370/148 operating under DOS/VS. The LCU supports an RCU in Los Angeles which, in turn, supports 16 Harris Corp. 8170 interactive CRT terminals, a 165 char./sec printer and a 200 line/-min printer. All of these devices communicate with the mainframe over a single satellite link at 9,600 bit/sec.

Parent explained that the decision to install the Paradyne system came about as a result of steadily degrading CRT response times as more and more devices and applications were implemented in Los Angeles. "When the CPU has to poll 16 to 18 devices and wait for acknowledgements, the overhead is just too high and response time suffers," he commented.

Prior to implementation of the PIX-II system, data communications traffic was increasing as the company added general accounting applications to the high-volume order entry applications, further compounding the problem of slow response time. "It was a situation of too many users competing for the attention of the mainframe," Parent said.

(Continued on Page S/31)

DATA BASE CONTROL.



Satellite Link Lets Firm Cut Response Time

(Continued from Page S/30)

"There were only two alternatives to the PIX-II system: We could have put in a second satellite link at a cost of around $2,100/mo — about the same cost as the PIX-II sysetem. Or we could have upgraded our mainframe for an additional $10,000/mo. But although these alternatives would have speeded our processing capability, they could not have done what PIX-II does — that is, give us faster CRT time," he said.

Remote Printer Use

Response time improvement also resulted in more efficient use of the two remote printers in Los Angeles. American Fabrics prints out management exception reports at night.

"Getting those reports out immediately is critical to our same-day policy," Parent said. "Unless they are printed out and kept absolutely current, there is no way we can respond to customers' orders for fabric in a timely fashion. Many of our customers are smaller decorator or upholstering shops, and the sooner we can get the product to them, the sooner they get paid by their customers."

Under the old communications system, response time on the printers was so slow that when the regular day's work would begin, the printers were still tied up printing out the previous night's reports and couldn't be used for more critical work, Parent recalled. The problem was not with the speed of the printers, it was with the speed at which they received data.

"Binary synchronous protocol only allows one-way data transmission and it was killing us," he noted. "SDLC allows the simultaneous two-way transmission of data over the same communications link and effectively doubles the transmission rate," he added.

While SDLC offers definite advantages over binary synchronous protocol, including two-way transmission and data transfer rates up to 56K bit/sec, Parent cited general resistance among DP users to its implementation. "Large systems software programs and a good deal of systems programming manpower are usually required to support it in an IBM environment," he said.

"By contrast, we were up and running with the PIX-II system in a matter [illegible] programmers [illegible] CPU [illegible] processing [illegible] Los Angeles [illegible].

[illegible] and [illegible] manage [illegible] control of all [illegible] functions [illegible] Los Angeles and the CPU in Massachusetts [illegible] handled by the PIX-II [illegible]

Transparency an Asset

[illegible] the PIX-II between Los Angeles and Massachusetts, American Fabrics [illegible] multiline [illegible] smaller [illegible] Dallas and [illegible]

In [illegible] Parent [illegible] communications support [illegible] would require [illegible] based systems [illegible] have less than half [illegible] remote devices the Los Angeles [illegible]

"What is [illegible]," he added, "is that the PIX-II is coexisting nicely with our older telecommunications systems. Because it is totally transparent to both the remote user and host it has allowed us to continue to use the Comten system under NCP VS and Btam to support low-volume remote operations."

American Fabrics is currently implementing a second PIX-II RCU, 16 CRTs and two line printers at its expanded Dallas warehouse facilities. Next year the firm plans a third link to its new Chicago warehouse.

"Those planned installations illustrate what we consider to be the criteria for switching from a binary synchronous communications system to the faster PIX-II SDLC — the need for local response time in a high-volume interactive [illegible] at a remote site," Parent concluded.

How Honeywell helps you manage all that data.

As computer users move into interactive and distributed systems, large data bases become increasingly necessary. And the storage and retrieval of this data becomes a problem.

Some computer manufacturers simply recommend more computer hardware. But this fails to address the key issue of *control*.

At Honeywell, we make effective control of data the foundation of our interactive and distributed systems. This control is provided by proven data base management techniques.

We pioneered and improved data base management.

The Integrated Data Store system introduced in 1963 is regarded as the industry's first. Its innovative data base structuring techniques have been imitated by others, and from it evolved the current CODASYL standards.

Now, after years of data base installation experience, I-D-S has evolved to today's Data Management-IV system, which provides a broad range of integrated online data management capabilities. Through a set of compatible software subsystems, DM-IV supports concurrent access by large numbers of users to common shared data bases in both conversational and procedural processing modes.

Now we lead with relational techniques.

Our Multics Data Base Manager is the industry's first fully implemented relational data base capability commercially available from a computer manufacturer. MDBM offers an exceptional degree of user flexibility. The result is an opportunity for a significant increase in the productivity of both programmers and end users.

Our systems are easy to install, easy to maintain.

Honeywell data base design and definition techniques make it simple to set up your data base in the first place. Independence between the data structure, application programs, and mass storage devices means you can make changes in one area without having to redesign others.

Data integrity and security are safeguarded.

Honeywell data base systems, and their hardware and software, provide outstanding controls to protect your data from accidental destruction or from unauthorized access.

Control. It's what managers need most.

From the most complex computer systems to the simplest control devices, providing better ways to help you control your business has always been our business at Honeywell.

For more information on Data Base Control, write: Honeywell, 200 Smith Street (MS 487), Waltham, Massachusetts 02154.

Honeywell

Net Provides APL Service

(Continued from Page S/24)

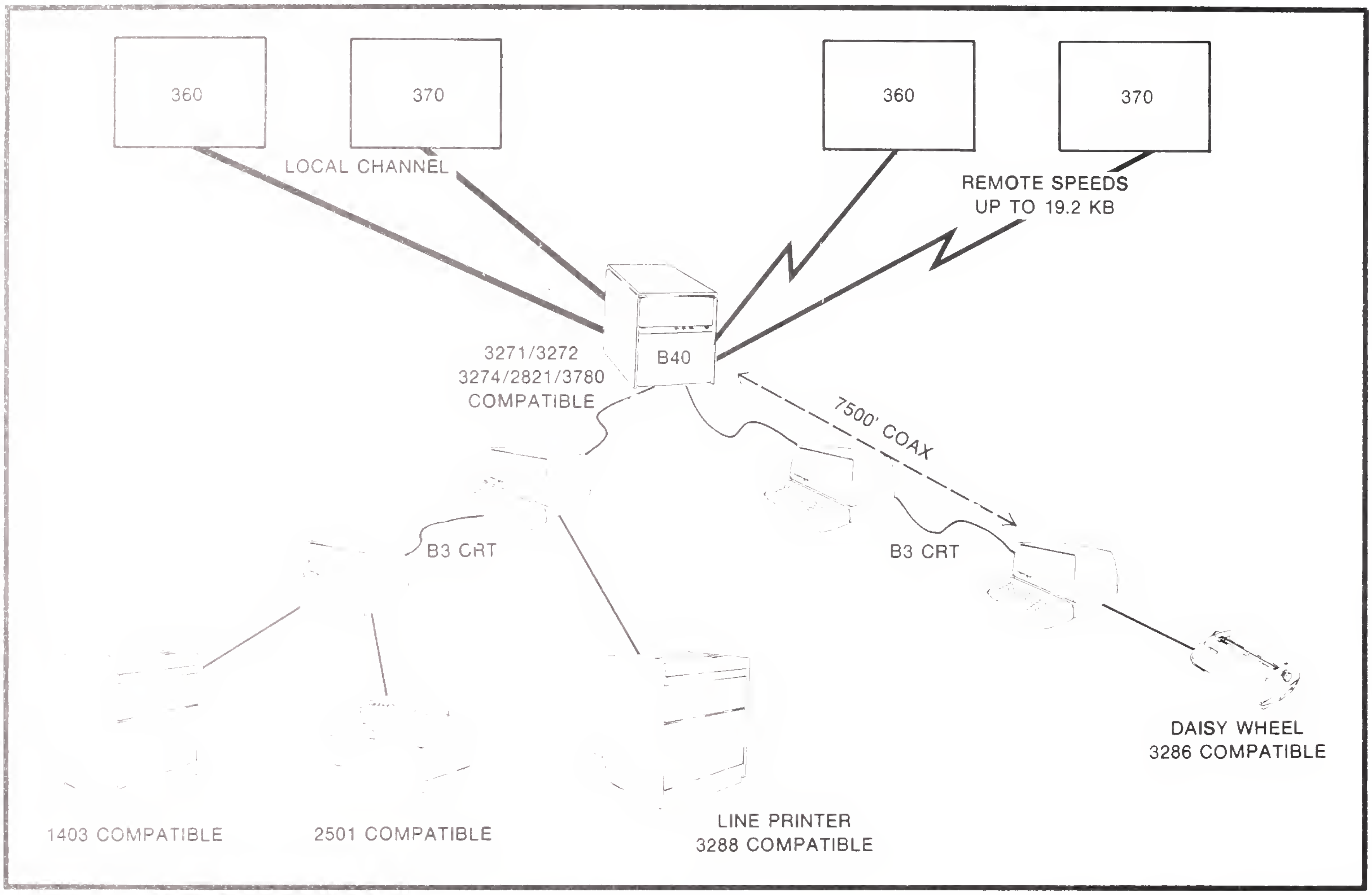
When the front end computer signals a new connection to APL, control information pertaining to the call is transmitted to APL. The terminal protocol (Ascii vs BCD), terminal speed, port location and the user's right parenthesis are passed to APL.

The APL software needs all of the information except port location to communicate with the user's terminal.

Conversion from TDM technology to packet-switched [illegible] has been done with minimal [illegible] to APL. Both the internal [illegible] and the external [illegible] mately as they were before the introduction of packet switching. There has been some [illegible] response [illegible] in order to achieve greater [illegible] capacity. [illegible]

[illegible] Associates Ltd. [illegible] was [illegible] APL [illegible] at IBM.

3270 USERS
BRAEGEN = COMPATIBILITY **PLUS**


360
370
LOCAL CHANNEL
360
370
REMOTE SPEEDS UP TO 19.2 KB
B40
3271/3272 3274/2821/3780 COMPATIBLE
7500' COAX
B3 CRT
B3 CRT
DAISY WHEEL 3286 COMPATIBLE
1403 COMPATIBLE
2501 COMPATIBLE
LINE PRINTER 3288 COMPATIBLE

GET THESE IMPORTANT BENEFITS

- **MULTIPLE HOST ATTACHMENTS.** A single B40 controller can attach to several 360/370's. Mix Local and Remote attachments. Reduced number of controllers.
- **SWITCHABLE CRT's.** Each B3 operator can switch between available host attachments (again, mix locals and remotes). Switch between different IBM addresses on the same 360/370. Often, one Braegen B3 CRT can replace several 3270's.
- **SHARE CABLES.** Braegen CRT's (and printers, too) can share the same coax. You don't need a separate expensive coax cable for each B3 CRT. Just daisy chain new B3 CRT's to existing coax.
- **LONG CABLES.** CRT's (printers, too) can be up to 7500 feet from the B40. Often, this lets you use local 3270's instead of remotes. Saves 370 software size, polling and you get faster response. Sometimes, this even saves you a separate controller.
- **BETTER I/O.** A wider range of speeds, and better print quality than you'll find elsewhere for 3286/3288 compatible printers. 1403 compatible printers and 2501 compatible card readers can be located up to 7500 feet outside the computer room thus eliminating all the special TPgear you have with RJE.
- **PLUS** **. . . Low cost and fast delivery.**

Customers throughout the U.S. are receiving these benefits today. For more information please contact
The BRAEGEN Corporation, 20740 Valley Green Drive, Cupertino, California 95014. (408) 255-4200

BRAEGEN

A Marked Shift in Attitude

Management Entering Age of Master Planning

By Errol Gold
Special to CW

Most information networks have evolved without a master plan, primarily because technology has likewise evolved in a piecemeal fashion, intent upon fulfilling immediate applications needs rather than providing tools with the flexibility to accommodate future contingencies.

The industry has been conditioned to think in terms of decade-long (or less) life cycles for systems, at the end of which it starts over again, admittedly with better tools for doing certain jobs but without the wherewithal or the time to plan and implement a management-oriented network with a life cycle independent of its hardware components.

The development of processors and system software for specific functions such as batch processing, interactive data entry and time-sharing has led to multiple networks that can't be linked together.

Now that there is a strong demand for large-scale communications networks, the user faces a difficult decision as to whether or not to overlay another specialized system over existing systems, thereby generating excess operating costs and inefficient utilization of host computers and communications lines.

New Age

A marked shift in attitudes of large-scale DP managers heralds an age of master planning independent of vendor-advocated solutions. Whereas the DP manager previously viewed the computer as a solution for only the most critical accounting problems, he is now defining systems as tools for day-to-day management of an organization's entire operations.

There is very little talk these days of programmed decisions and a great deal of talk about human interaction with the computer at all levels of the organization to make human decision-making better and easier.

It is the intent here to discuss some of the elements of network master planning gleaned from cooperation with large-scale users.

Master planning is by definition a projection of events over a longer time period than conventional business planning and may encompass a number of alternate business plans. It extends the planning cycle by focusing on organizational purpose. Goals and objectives may change from year to year, but purpose is more enduring.

For example, one of our customers defined the overriding purpose of its network as improving customer service. The specifics are redefined each year, but the network is expected to be responsive to those specifics, whatever they may be.

Another DP manager was called upon to support a total restructuring of the way his company does business on a global level. He cannot afford the luxury of wondering what happens if the company makes a major acquisition five years from now or if the marketing department launches a major campaign in Africa.

His purpose is to be prepared to move information from any given point in the world to any other. If there are gaps today in technology or products meant for tomorrow's job, the master plan does not skirt them; it defines them, puts a timetable on them and calls for an ultimatum to the vendor community.

First Rule of Planning

So, we might conclude that the first rule of master planning is hardware/software (vendor) independence.

This statement then presupposes that:

- Incentives for developing and evolving future network technology will come from the user community, not from manufacturers.
- Users will not be limited to using one vendor's product line exclusively.
- The long-standing manufacturers' practice of "locking out" other vendors will gradually disappear. This applies as equally to peripherals and telecommunications equipment as it does to computers.
- Network architectures uniquely styled to accommodate one vendor will become a risky investment.

The fact that IBM supports and assists other vendors in tying into its Systems Network Architecture (SNA) assures that this is more than a trend. It is surprising that other mainframe and minicomputer firms have not made more of this issue, because there may be room for multiple architectures in the grand scheme of networking, providing they all work together.

Forsaking Top-Down Approach

The second most important element in network master planning is that implementation doesn't have to be linear, providing that all of the components are compatible or can be made compatible.

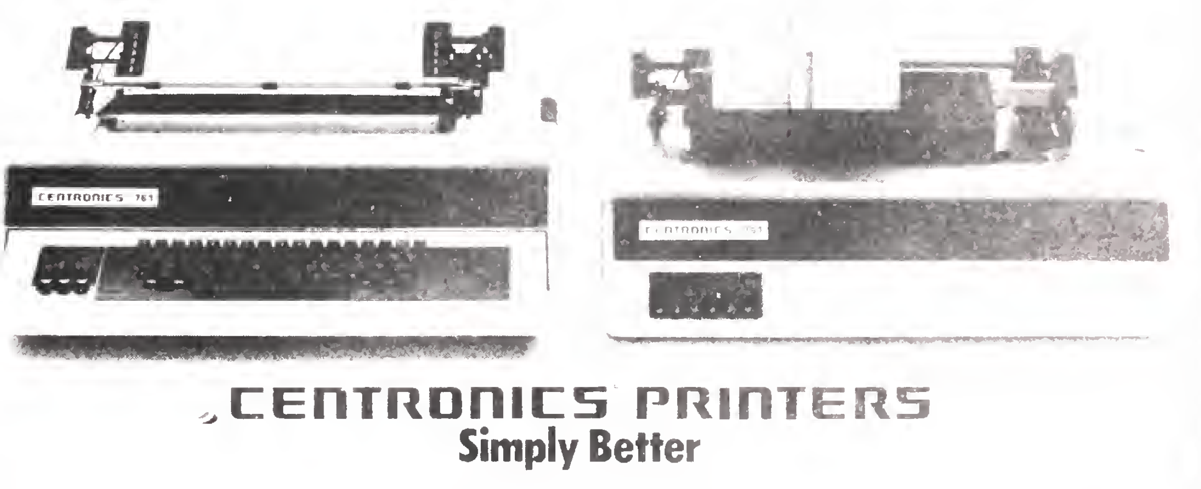
You can start in the middle, at the nodes or at the mainframe, whichever best serves the organization's purpose. This is evidenced by the fact that some SNA users will have their networks 50% to 85% installed before all of the components of SNA are fully de-

(Continued on Page 54)

Does increased forms handling flexibility make Centronics' teleprinters the best? NO. Even though Centronics' teleprinters now offer front feed in addition to top or bottom tractor feed, pin feed platen and pinch roll, they have much more than outstanding forms handling flexibility.

Centronics teleprinters can accept data up to 9600 bps under software or hardware control and have up to 7K of buffering for increased host efficiency, faster system response and lower line costs. There's "smart" bi-directional printing at 10 cpi for 132 columns or 12 cpi for 158 columns. Bilingual printing selected from 64 character sets. The finest dot matrix APL character set available today. Microprocessor control. Simplified modular design for superior reliability and ease of maintenance. And KSR and RO models in desk top or stand-mounted units. All at the price of most popular 30 cps printing terminals.

And as with all Centronics matrix printers, line printers and non-impact microprinters, the 761 teleprinters are backed by the largest worldwide service organization of any printer company. For complete information write or call Centronics Data Computer Corp., Hudson, NH 03051. Tel. (603) 883-0111.



CENTRONICS PRINTERS
Simply Better

Master Planning Means Looking Further Ahead

(Continued from Page S 33)

bugged and released.

This departure from top-down architectural design approaches is practical for a number of reasons.

First, if the distributed network processors support concurrent local processing and local data bases (as they should), they can start paying for themselves before they go on-line to a mainframe. In fact, for that previously mentioned user who emphasizes customer service, the remote site with its local files is far more critical than the mainframe because that is where the organization interfaces with its customers.

Second, if the network is truly transparent to the terminal user, then he doesn't really know how much or what parts of the network are up and running as long as requirements for the task at hand do not exceed his training to date and the network resources at hand. Maintaining that balance from beginning to end of implementation is a function of master planning.

Finally, if the user has a large investment in existing equipment and software (as he usually does), it is to his obvious advantage if a large percentage of that investment can be transferred either permanently or temporarily to the network under development.

One user candidly confessed that he would not have gotten his network off the ground without being able to use some existing equipment, even though that equipment is not part of the ultimate master planned network. Another advised us that he can get by for two or three years by using dial-up batch transmissions from remote processors of different vendors, freeing a portion of his limited budget to solve more pressing management problems.

Yet the user has not sacrificed his future potential for interactive mainframe communications. These options might not have been available with the top-down approach.

Addressing Contingencies

Another major element of master planning is addressing contingencies beyond the control of the organization. A master plan, as you might suspect, contains a number of "if-then" statements. But whatever the "if," the "then" has to leave the manager with a feeling of security for the many millions of dollars being committed to network development.

What if:

— a new generation of superfast bubble memory mainframes emerges?

— national telecommunications policy in Canada forces use of a nonstandard protocol?

— we enter a new round of legislation on computers and privacy?

— the network control center gets overloaded as more channels are opened and remote sites activated?

— public and private communications facilities continue to escalate in cost?

These kinds of questions, added to the sheer logistical complexity of a large network, prompted one of our customers to say that the old "40-20-40" formula in planning systems was not valid for networks. That formula simply means allocating 40% of resources to preplanning, 20% to implementation and 40% to follow-up. A more appropriate ratio, he said, is 60-20-20.

Not only are there more contingencies to plan for, but the difficulty in fixing problems after a network is running is magnified by the number of remote systems, the number of terminals, the number of people using the system, the number of applications programs being run and so forth.

User at the Helm

No single vendor is likely to point out such potential constraints and contribute independently to their resolution unless the user first defines the requirements and establishes a new basis of competition that focuses on where the user wants to go rather than what the vendor has on the shelf.

Budgeting is an element of master planning that doesn't require any justification, but there is one major difference with the new breed of network master planners that sets them apart: They are no longer considered by their management as an overhead expense or another necessary evil that one must tolerate if the business is to grow.

They are now an integral part of management, delivering tools to solve day-to-day problems directly affecting the conduct of business. As one customer put it: "Sure, we go out to the field, install a system and tell the local manager he can now do his job twice as fast with half the people. But it's his decision; it's his profit center, not DP's.

"He may choose to reduce his costs only through attrition or he may choose to put displaced employees to work doing something else that improves his organization's performance. It's none of our business. Our principal concern is that the manager be prepared technically and operationally to make knowledgeable decisions and, further, to oversee that intersite transactions function smoothly."

Obviously, though, there are still elements of overhead to contend with. According to a fairly comprehensive survey of SNA users by SBS Publishing Co., the most frequently cited disadvantage was underestimated costs, attributed mainly to increased mainframe memory requirements, lengthy and costly training, higher salaries for those trained and, in more than half the cases, an upward CPU migration. A large percentage of respondents said

Looking back.
And ahead.

All indications have it that 1978 will go down as another banner year for the computer industry. User spending for 1978 should at least match the IDC — projected $42+ billion, up 15% from 1977. Budgets in almost every major category show increased growth over 1977, and 1979 is shaping up to be a repeat performance.

Our December 25/January 1 Combined Issue Special Report takes a look back at the year in computers, as well as a look ahead for 1979. The *Computerworld* editorial staff will take a break from the holiday season just long enough to give you some hindsight and foresight on topics like:

- *The impact of inflation on computer use and configuration*
- *User-vendor relations*
- *Market trends — products projections for '79*
- *The year in court — IBM and Memorex*

If you're concerned with the trends in the computer industry, you won't want to miss our Year-End Review and Forecast. And if you market products for the computer world, here is a good place to advertise. Color close is December 8; black and white close, December 15. Your *Computerworld* representative can give you all the details, and assistance in ad planning. Or, to reserve space, call Terry Williams at (617) 965-5800.

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Boston	New York	San Francisco	Los Angeles
Bob Ziegel	Don Fagan	Bill Healey	Bill Healey
Chris Lee	Frank Gallo	Donna Dezelan	Jim Richardson
Frank Collins	Peter Senft		Judy Milford
(617) 965-5800	(201) 461-2575	(415) 421-7330	(213) 475-8486

And Recognizing the User Organization's Goals

they did not achieve expected line cost savings.

We do not know how many of these users adopted the top-down approach, how many were mixed-vendor networks or how many were early victims of Parkinson's Law applied to systems, but we do know that our customers are accumulating savings at the nodes that just might absorb a lot of the added costs of SNA.

Whereas a few SNA users reported a two-year payback, most ranged up to five years.

Further Implications

Master planning implies, then, multiple return-on-investment analysis, multiple methods of acquisition (rental, lease, purchase), a mixture of private and common carrier facilities and other areas of financial planning — all staged to permit a network to pay for itself as it develops to the greatest extent possible.

Since the subject of an SNA survey was brought up, it is only fair to state that all users agreed that the advantages far outweighed the disadvantages, but further concluded that there is no quick and simple answer to whether SNA will benefit a given installation.

It is also interesting to note that the users' reasons for installing SNA did not correlate with the benefits cited after installation.

For example, centralized network control was one of the least mentioned reasons for switching, but was the most often stated benefit, all of which tends to support the case for master planning.

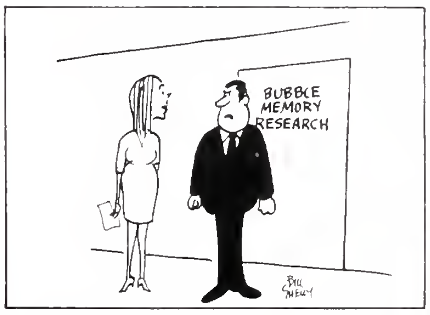
There are many other elements of network master planning, some of which are general and some of which are unique to a particular user. It is an art that might be described as a superset of all the planning functions that go into system definition, hardware selection, implementation and management extended much further in time.

Customer reaction to Computer Automation, Inc.'s master plan for product development has been favorable. Under the plan, products must:

- Accommodate other vendors' equipment — IBM 3270 terminal clusters, IBM 3790 systems, Dataspeed 40/4 clusters, X.25-compatible devices and peripheral devices from many different manufacturers.
- Concurrently support major protocols — Synchronous Data Link Control, X.25, bisynch (2780, 3780, 3270, Hasp/20).
- Allow for centralized control and security — downline loading of software, downline loading of remote diagnostic software, protection of network integrity if any element goes down.
- Aid data base management — permitting users to design distributed data bases which, subject to predetermined controls, provide access to files resident at any location in the network by terminals anywhere else in the network.
- Allow for two independent and concurrent synchronous communications links from each processor, which facilitate interactive data traffic with both the mainframe and other elements of a network.
- Protect against obsolescence. Since all components interface to the network, rather than to each other, any component (including the mainframe) should be upgradable without dislocating the entire network. Distributed processors interface to the network via software and have a library of software emulation packages that keep them flexible to future changes.
- Protect against escalating communications line costs. Local data bases plus node-to-node direct link up allows users to optimize volume and schedules of traffic. (Dynamic load-leveling algorithms must be developed to produce self-optimizing networks.)
- Protect against overloading the network. The protection will involve a combination of previously noted load-leveling features, distributed data bases, front-end devices and the expandability of the network to further hierarchical levels of distributed processing.
- Provide for advances in satellite technology. Changes will be required in procedures to compensate for propagation delay problems and to take advantage of the broadcast mode of satellite transmission.
- Allow for unlimited growth potential, made possible by interlocking networks, with network traffic controlled by dedicated minicomputers, all totally transparent to the terminal operator.

Such elements of a vendor's master plan can hardly be a secret because they echo the customer's present and future needs. How the vendor does it is his business. That it gets done is the business of user master planners.

[illegible] Gold is technical director at the Commercial Systems Division, Computer Automation, Inc., Irvine, Calif. 92713.



'Ms. Baxter, Please Tell the Staff to Quit Referring to Me as Bubblehead.'

"WE RENT THE BEST."
—Jim Brown, National Rental Specialist

Our General Electric Communication Sale [illegible] rent only the best.

Our Video Display Terminals have more standard [illegible] tures than most terminals have options: cursor control [illegible] function keys, status line, numeric pad, line drawing [illegible] visual highlighting, self diagnostics, auxiliary [illegible] upper and lower case, and extensive formating. All [illegible] settle [illegible] one low monthly rental that includes General Electric [illegible] Neither should you.

Call your nearest General Electric Communication Service location today

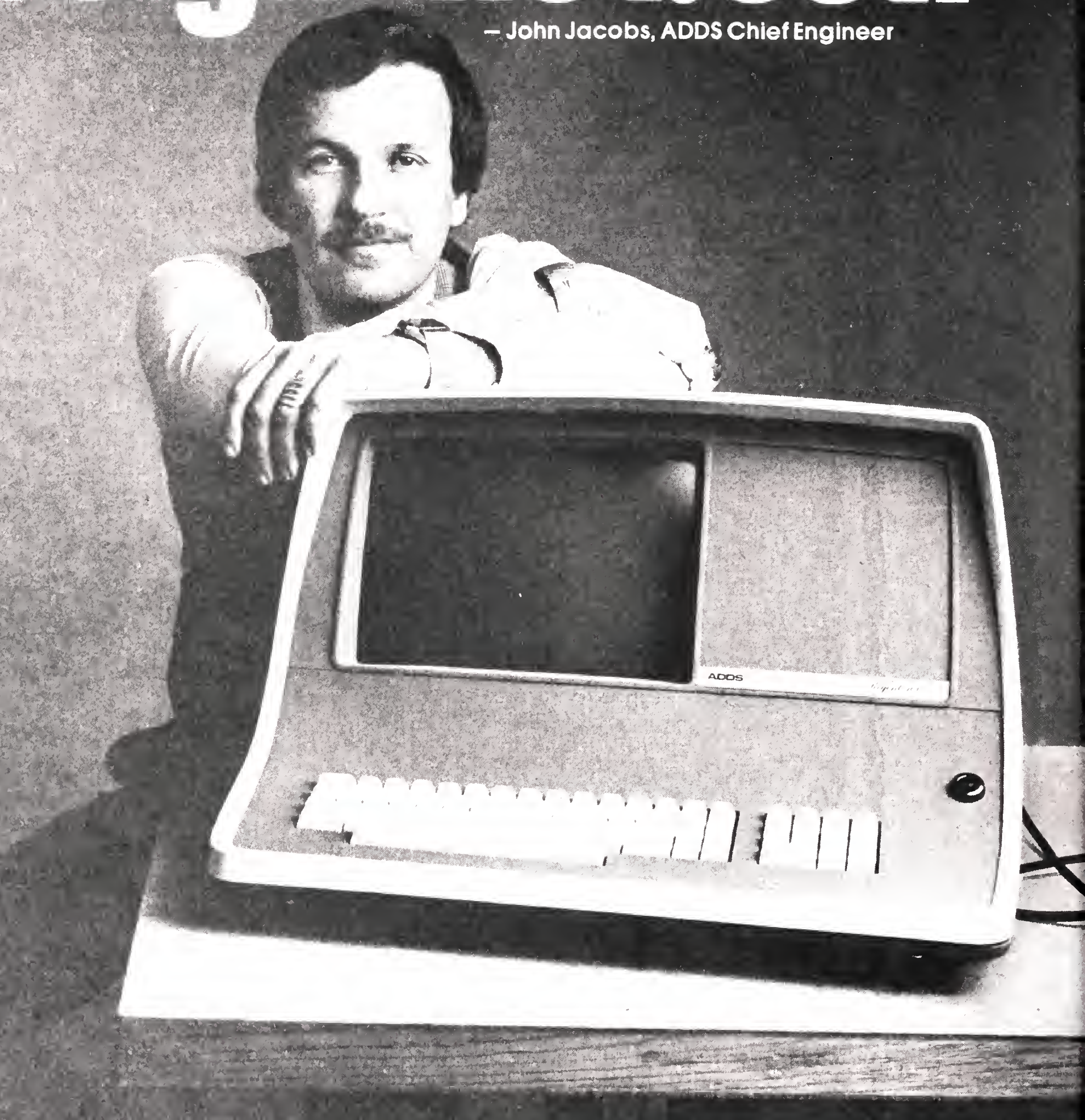
Ala [illegible] • Ariz [illegible] • Calif [illegible] San Francisco [illegible] • Col [illegible] • Conn [illegible] • Wash. DC [illegible] • Fla [illegible] Ft. Lauderdale [illegible] • Ga [illegible] • Ill [illegible] Ky Louisville [illegible] • La New Orleans [illegible] • Md [illegible] • Mass [illegible] (61[illegible]) 285-6700 [illegible] • Minn [illegible] • Mo [illegible] N.M Albuquerque [illegible] • N.Y [illegible] N.C Charlotte [illegible] • Ohio [illegible] Okla Oklahoma City [illegible] • Ore [illegible] • Penn [illegible] (41[illegible]) 462-7400 [illegible] • S.C Greenville [illegible] • Tenn [illegible] • Tex [illegible] Dallas Ft. Worth [illegible] El Paso [illegible] Houston [illegible] • Utah [illegible] (70[illegible]) 886-1[illegible] Richmond [illegible] • Wash Kent Seattle [illegible] • WV [illegible] • Wis [illegible] • Canada Calgary [illegible]

GENERAL [illegible]
INSTRUMENTATION [illegible]

GENERAL ELECTRIC

"I design the best."

— John Jacobs, ADDS Chief Engineer



ADDS Regent is about the best TTY terminal money can buy. I know. I designed it.

State-of-the-art; Regent uses the highest performance microprocessor components available. I know. I specified them.

In fact, our sophisticated technology means Regent is a remarkably simple terminal. It has fewer components than most of our competitors. That means fewer problems. And more Regents in your future.

From the beginning, I've designed ADDS equipment to be the very best. And 65,000 installed terminals have proved me right.

ADDS Regent. Quality you can rely on.

ADDS, Applied Digital Data Systems Inc., 100 Marcus Blvd., Hauppauge, N Y 11787, (516) 231-5400.

ADDS REGENT

Charges Microdata 'Unethical'

User 'Misled' Regarding Upgrade Costs

By Jeffry Beeler
CW Staff

BELLEVILLE, N.J. — A user here thought it could afford to make desperately needed enhancements to its minicomputer system until the company discovered recently that a proposed operating system upgrade would cost at least 25 times more than its vendor's original estimate.

Now, the user — Hardman, Inc., an industrial adhesives manufacturer — has at least temporarily abandoned its planned software enhancement as too expensive, and company vice-president John Hardman has accused his vendor of "unethical" marketing practices.

Hardman charges the vendor, Microdata Corp., with deliberately "misleading" him about the full cost and consequences of upgrading from the 2.5 release of the Microdata Reality operating system to the more powerful 3.0 release.

When Hardman first inquired about such an upgrade early this year, he was reportedly informed that the procedure would merely involve swapping one operating system release for another and would cost just $2,500 — a figure even his small firm could comfortably afford. But when he later tried to obtain the 3.0 release, he reportedly found that the local Microdata dealer — Minicomputer Sales and Leasing, Inc. — had neglected to tell him that the upgrade also involved the purchase of a configuration chip, a programmable read-only memory that had not been required for the older 2.5 release.

Without the configuration chip, he learned, the enhanced software product would prove practically worthless because it would not be able to accommodate any of the memory modules and peripherals he had added to his system since its acquisition a year earlier.

Dealer's Demands

Unfortunately for the user, the dealer reportedly refused to sell Hardman the indispensable configuration chip until he first bought from Microdata all the expansion hardware he had originally obtained from independent vendors.

To make matters worse, the dealer insisted Hardman buy the equipment at Microdata's own prices, not at the [illegible] open market prices he had formerly paid.

The dealer representative who reportedly negotiated with Hardman could not be reached for comment on the charges. Microdata, however, denied any wrongdoing in the incident.

If Hardman had complied with the Microdata dealer's demands, the cost of rebuying all his expansion hardware modules would have totaled an estimated

(Continued on Page 62)

Slew of Enhancements, Additions Give Wang Users Upgrade Paths

By Jeffry Beeler
CW Staff

LOWELL, Mass. — Wang Laboratories, Inc. extended the upgrade path for a large segment of its customer base when it recently announced a raft of additions and changes to its bottom-, middle- and top-of-the-line systems.

With the announcements, Wang added 11 hardware offerings to its high-end VS systems series, an extension to its low-end PCS desktop computer series and three products to one of its mid-range lines, the MVP.

In addition, the company expanded its VS and MVP configurations and announced assorted price cuts for the high-end series.

Some of the hardware additions to the VS systems include the 2246S serial workstation plus the 22V07 workstation/printer I/O processor (IOP), the 2280V series of fixed/removable disk systems plus the 22V08 disk unit IOP and the 2209V-2 magnetic tape unit plus the 22V05-2 tape system IOP.

The remaining VS series hardware introductions include the 430 line/min 2263V-3 chain-line printer, the 2256 series serial interface and three communications offerings — the 2249V-6 remote cluster controller, the 2246R stand-alone remote workstation and the 22V06-3 communications IOP.

With Wang's recent enhance-

(Continued on Page 64)

Wang recently added 11 products plus main memory and disk unit enhancements to its VS systems line.

Mini Sends Pharmacist Home Without Briefcase

By Marguerite Zientara
CW Staff

HERRIN, Ill. — Ernie LeQuatte no longer has to take paperwork home at the end of the day from the drug store he owns, thanks to a minicomputer that keeps his records current with each transaction.

With a drug store that fills more than 300 prescriptions per day, LeQuatte automated his operations because of the large amount of paper processing that is required in third-party drug prescription programs, such as public aid plans and insurance plans.

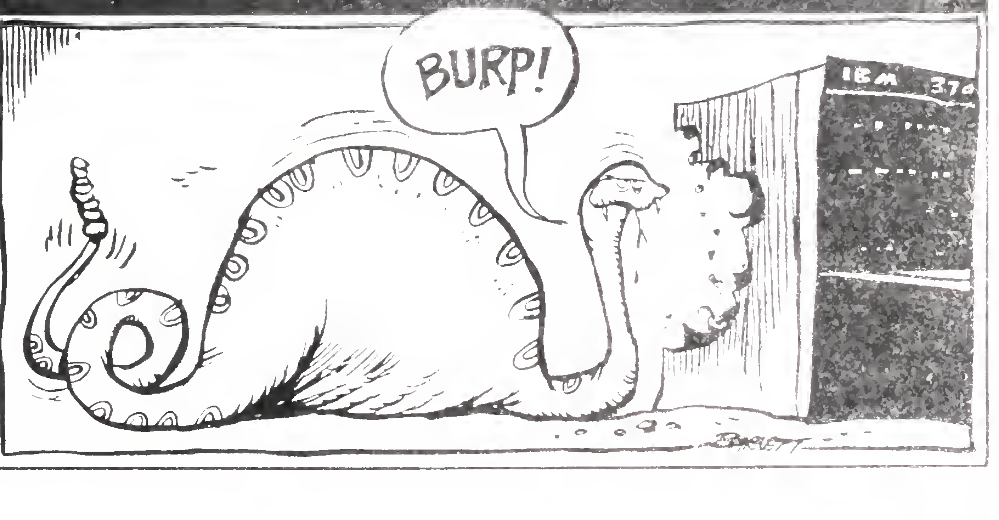
For a year and a half, he occasionally visited Midwestern computer companies in search of a minicomputer system that would fit his needs and budget. After evaluating systems from Texas Instruments, Inc. and IBM, he opted for a Honeywell, Inc. Level 6 minicomputer marketed by General Computer Corp. (GCC) of Macedonia, Ohio.

"I looked at GCC's software system and thought it was the most fantastic thing I've ever seen," LeQuatte said. When he first observed the software in action, it was installed in a chain drug store and was running on Singer Co. equipment.

GCC also displayed the system at its offices, where it ran at a faster speed on Wang Laboratories, Inc. equipment. "When GCC began putting together a pharmacy oriented package, Honeywell offered a good piece of equipment at a price retail pharmacists could afford," LeQuatte said.

The major benefit of the system

(Continued on Page 66)



"FREE" SOFTWARE GOBBLING UP YOUR MACHINE?

CHECK ONE: (1) YES ☐ (2) YES ☐

If you checked one of the above, you should check one of these:

FLEE/FLIM The most widely used DOS/VS linkage-editor and library maintenance package in the world.

MCPU The only logical way to manage DOS/VS in a multiple-CPU or VM environment.

FAQS Combination console spooler and partition balancer package for DOS/VS.

FTL The Fast-Transient-Loader. It's Faster-Than-Light.

GOAL SYSTEMS - The CPU Savers
P.O. Box 29481 Columbus, Ohio 43229
Phone: 614/ 268-1775 Telex: 245337

TERMINAL RENTALS

43
$67 50 MONTH*
$46 80 Month on 36 month Lease Purchase Plan

33 ASR-FF
$54 00 MONTH
TWX-DDD
$79 50* MO
TELEX
$76 50* MO

ADM-3A
$49 50* MONTH
ADM-1A — $73.00 mo.

COUPLERS/MODEMS
TC 3002 O/A Acoustic 12 00 mo
TC 5001 202T 18 00 mo
TC 4001 113B Auto-Ans. 18 00 mo

300 LPM
IMPACT PRINTER
EIA or Parallel interface
$281 00 MONTH*
$197 00 Month [illegible]

All equipment includes national service
*Based on 12 month contract, service included
Get complete details with a direct call:
800/527-7700
or 214/252-7502 • Service 800/527-5608
TWX 910/806-5761 • TELEX 73-0022

vardon
& associates, inc.
[illegible] N. Beltline Road • Irving, Texas 75061

SERVICE PROBLEMS?
NATIONWIDE SERVICE
356 CITIES
TECHNICAL ASSISTANCE BROKERS
800/527-5608
IN TEXAS CALL
800/492-9602 or 214/258-2620
VARDON & ASSOCIATES, INC 1978

Fairchild Host Eases Product Tests

CHERRY HILL, N.J. — A host system from Fairchild Camera and Instrument Corp. reportedly allows automatic test networks to concentrate on their main function — product evaluation — by freeing the networks of ancillary tasks like program development, report generation, data display and communications.

Described as a central data base that processes and analyses data from automatic test systems, the Integrator II provides five times more processing power than the Integrator I, from which it was updated, according to a spokesman.

Fairchild credited the performance boost to the Integrator II's floating-point processor, fast Fortran processor and CPU, which consists of a Hewlett-Packard Co. 1000 modified with the company's microcoded instructions.

The floating-point unit reportedly executes single- and extended-processor operations in 4.9 and 6.2 microsec, while the fast Fortran processor is said to speed common Fortran routines by two- to 20-fold.

In addition to an 128K-byte CPU, the system incorporates up to 32 CRT terminals, an 800 bit/in. tape system, a printer and 19.6M bytes of disk storage expandable in 19.6M- or 50M-byte increments to 400M bytes. The terminals can operate as far as 16,000 ft from the system through dial-up or leased phone lines, the source said.

Among its other hardware features, the Integrator II provides an interface for IBM 360 and 370 mainframes and connects to as many as eight concurrent test systems.

Applications software for the system includes data analysis and tester communications packages plus utilities.

A basic Integrator II costs $153,000. It will be available in January from Fairchild's Test Systems Group at 1725 Technology Drive, San Jose, Calif 95110.

User 'Misled' Regarding Upgrade Costs

(Continued from Page 61)

$63,000 — a sum many times greater than the vendor's original price quote and well beyond the financial reach of his 85-employee firm.

As a result, Hardman now finds himself unable to obtain the necessary configuration chip and thus effectively barred from acquiring the 3.0 operating system release, which he says could dramatically improve the performance of his badly overworked system.

Moreover, Hardman's company may be just one of many users who have been similarly victimized, knowingly or unknowingly, by Microdata's marketing policies. "I'm not alone," he warned. "A lot of other Microdata users are also being hurt.

Elaborating on his claim, Hardman accused the vendor of forcing its users to pay "unrealistically" high upgrade charges by preventing them from obtaining their expansion hardware on the open market, where memories and peripherals sometimes cost three to four times less than comparable Microdata equipment.

'Lock-In' Hinges on Chip

To a large extend, Microdata's alleged efforts to "lock in" its customers hinge on its configuration chip, Hardman added. Mounted on a Reality CPU's microprogramming firmware board, the configuration chip controls the amount of core memory, the number of CRT terminals and the amount of disk storage the processor can address.

When Microdata installs one of its systems, the vendor "sets" the accompanying configuration chip to accept only a user's existing configuration. If the user later wants to expand that configuration, he must obtain a new chip that can accommodate the additional equipment.

Unlike most other kinds of hardware, however, the Reality configuration chips are not available from independent sources. Thus, Microdata system users must return to their vendor for all their expansion hardware, or they won't receive the necessary configuration chips, Hardman claimed.

Of course, a headstrong user can still attach foreign memory modules and peripherals to his system if he wishes. But without the appropriate configuration chip, the system's CPU will be unable to address them.

Luckily for Microdata, Hardman added, few customers thus far have objected to the company's "wacky" sales practices — a fact he attributes mainly to user naivete.

"Most users are inexperienced and don't realize they're being locked in," he said. "I'm astonished when I go to users group meetings and see how unsophisticated some of the people are. They're plinking down their money thinking they're buying their way to the future when in fact they're buying the privilege of spending exorbitant sums for their hardware in the future."

Microdata's Response

Responding to Hardman's charges, Microdata's Marketing Services Director Frank Robertson denied his company prohibits its users from going elsewhere for their expansion hardware.

"Of course we want to encourage our users to buy their peripherals from us," he explained. "We don't sell our operating system separately. So we can only make money by selling our software and hardware as a bundled system." Accordingly, Microdata provides its configuration chip free to users who buy all their peripherals from the vendor.

But this marketing policy does not "lock in" Microdata's customers, Robertson added. Users who insist on obtaining their expansion hardware on the open market can still do so. They must, however, pay Microdata a fee for a new configuration chip so that their CPUs will recognize the additional hardware.

Robertson also denied Hardman's charge that Microdata misrepresents its upgrade costs by neglecting to tell users about the price of its configuration chips. "I know for a fact that all our direct sales branches inform their customers about the full cost of our upgrade," he said. "And I assume our dealers do so as well, but I can't say for sure."

In other comments, Robertson questioned Hardman's motives in criticizing Microdata's marketing practices. "He's not just a casual Microdata user," the sales director said. "He's also a used Microdata equipment dealer who has invested a lot of money in his business. Now, because of the introduction of the configuration chip with the 3.0 release, he finds himself on the outside looking in."

Although Hardman admitted being a dealer of used Microdata equipment, he denied his business interests have prompted his complaints against the Irvine, Calif., company.

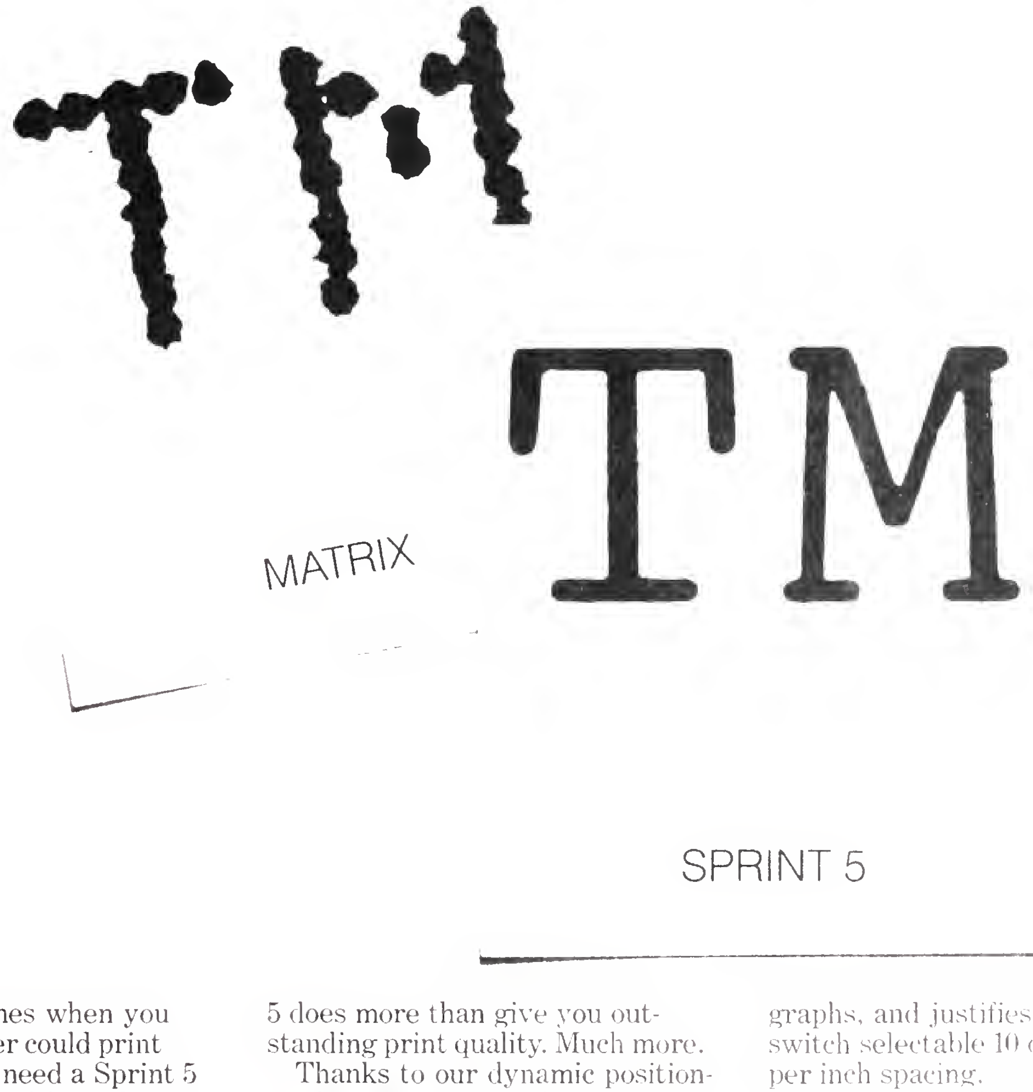
A complete modem tester for $345?

ACTUAL SIZE: 6½" x 4¾" x 1½"

Yes. The Multi-Tech MODEM-MICROTEST. It analyzes performance in both synchronous and asynchronous modems, generates four different data patterns, detects and counts errors, performs handshake functions, provides RS232 leads for signal testing, and much more. The MODEM-MICROTEST is battery operated, rechargeable and extremely compact.

Please call or write for more information.
MULTI-TECH SYSTEMS, INC.
82 SECOND AVENUE S E • NEW BRIGHTON, MINNESOTA 55112 • (612) 631-3550 • TWX 910-563-3610
We also manufacture acoustic couplers and 300 and 1200 bps modems.

Quality print is Sprint 5's trademark.



For all those times when you wish your computer could print letter quality, you need a Sprint 5 Daisywheel Terminal from Qume.

Its fully-formed characters are always clear, distinct, eminently readable. (Even after they've been enlarged 1000%.)

Perfect for executive reports, financial statements, and any other application where neatness counts.

But the Sprint 5 does more than give you outstanding print quality. Much more.

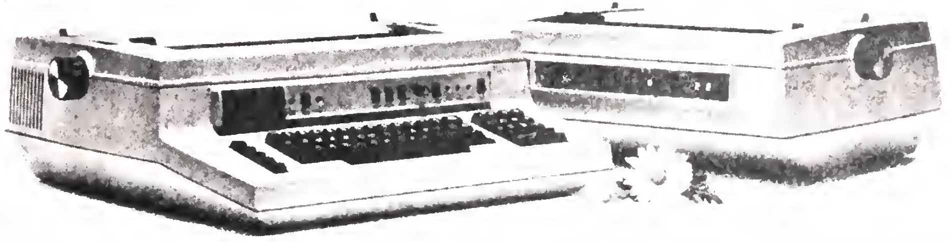
Thanks to our dynamic positioning feature, it easily plots, creates graphs, and justifies text. With switch selectable 10 or 12 character per inch spacing.

What's more, Sprint 5 comes with a wide selection of MultiColor™ ribbons including red/black. And over 60 different typefaces.

The Sprint 5 Daisywheel Terminal and RO Printer from Qume.

When it comes to dots versus daisies, our advantages are easy to see.

Qume®
the printed word



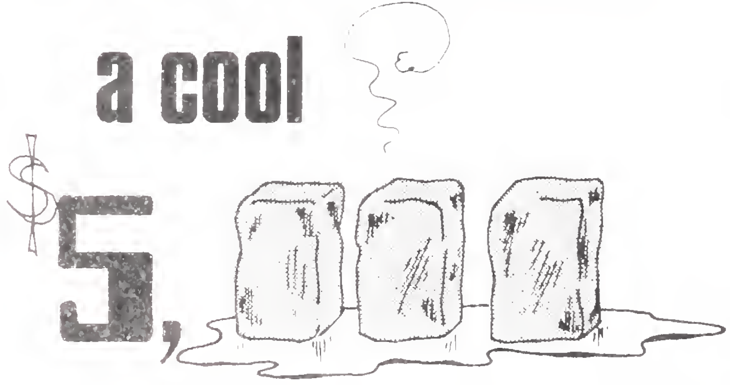
For more information, contact your nearest data terminal dealer or Qume, 2323 Industrial Parkway West, Hayward, California 94545.

now
FLOPPY'S COME IN A FLIP-TOP BOX
wabash
WABASH DEALERS, HAVE WE GOT YOUR NUMBER? IF SO, CONTACT US IMMEDIATELY!
AD11382841799 · AD11301000055 · AD11382001733
AD11382841788 · AD11382881733
CALL FREE
800-323-9868
wabash

There's only one big difference between our printer and the rest of the market. Ours is just

a cool

$5,000



Announcing the BISCO 1087-132 and 1087-80 printers!

BISCO now offers users of NOVA* and ECLIPSE* computers a 300 lpm printer and interface for only $5,000. You get TELETYPE** reliability plus the convenience of plugging the printer directly into the backplane of the computer. No special requirements beyond the interface board that fits into any NOVA* or ECLIPSE* chassis.

SPECIFICATIONS:

Speed 300 lpm monocase — 220 lpm full ASCII (80 col slightly faster)
Width 80 col or 132 col
Horizontal and vertical tabulation selectable under program control
Single or double line feed capability
Local test checkout of the printer
Prints standard (tractor feed) fan fold forms 4-1/8 to 15" wide, 2-1/2 to 22" long
Sound reducing enclosure for printer, mounted on pedestal stand
Single board interface to DGC minis

* *NOVA and ECLIPSE are registered trademarks of the Data General Corp., Westboro, MA*

** *TELETYPE is a registered trademark of the Teletype Corp., Skokie, IL.*

business information systems company BISCO

Post Office Box 6254
Albuquerque, New Mexico 87107
Telephone: (505) 298-5516

Wang Offers Upgrade Paths

(Continued from Page 61)

ments, the minimum main memory for VS processors has doubled from 64K bytes to 128K bytes, and the maximum number of terminals the CPUs can support has grown to 32 — a 40% increase.

The company has also enhanced two of the three existing VS disk system models to allow them to accommodate up to 2.3G bytes of formatted storage, a spokesman said. Previously, only one of the disk units stored that much data, while the other two held a maximum of just 150M bytes.

In other VS series developments, Wang cut the price of a 64K-byte memory upgrade from $6,000 to $5,000 and the price of the 75M-byte 2265V-1 disk unit from $20,000 to $19,000.

In the MVP product line, the firm introduced the MVP-A processor chassis and a slightly modified version of the 2280 fixed/removable disk. In addition, the company quadrupled the MVP's maximum main memory capacity from 64K bytes to 256K bytes.

Taken together, these hardware additions and the accompanying enhancements increase the capacity and configuration options available to VS and MVP users and thus help ensure they will not outgrow their upward-expandable systems, the spokesman explained.

At the low end of the Wang product spectrum, the firm equipped its PCS-II desktop computer with a system disk multiplexing capability to produce the PCS-IIA, which can reportedly serve as an intelligent terminal for on-line hosts like the Wang 2200T, 2200VP and MVP.

Noteworthy Announcement

Of all the hardware involved in Wang's most recent product announcement, the single most important is probably the 2280 disk unit series, according to the spokesman. Positioned in the middle of the company's disk systems family, the 2280 series units are believed to be the only mass storage modules in their size class to offer both removable and fixed media.

In the VS series, the 2280 consists of three models, the 2280V-1, which stores a total of 30M bytes; the 2280V-2, which holds 60M bytes; and the 2280V-3, which accommodates 90M bytes. All three provide 15M bytes of removable storage, with the remaining memory residing on fixed media.

In the MVP line, the 2280 series also consists of three models, but they differ slightly from their VS counterparts in total capacity. The 2280-1 stores a total of 26.8M bytes, the 2280-2, 53.6M bytes, and the 2280-3, 80.4M bytes. Each model places 13.4M bytes of its total storage on removable disks and the rest on fixed media.

But despite the differences in memory capacity, both the MVP and VS versions of the 2280 series store 6,000 bit/in. and transfer 1.2M byte/sec with a 30 msec average seek and 6 msec track-to-track access.

The 2280 models 1, 2 and 3 cost $19,000, $21,000 and $23,000, respectively, and will become available for shipment in January. The three VS versions of the 2280 series, by contrast, cost $17,000, $19,000 and $21,000 and are available now.

Unlike their MVP counterparts, the VS 2280 models provide a companion disk unit IOP, the 22V08. Intended as a replacement for Wang's VS 22V03 and 22V04 IOP, the 22V08 controls any combination of up to four 2280V or 2265V disk units. The 22V08 costs $6,000 and, like the split-pack disk unit it supports, is available immediately.

Serial Workstation

Elaborating on its other recent VS series offerings, Wang credited the 2246S serial workstation with using a full upper and lower case Ascii character set to display 24 lines with 80 char./line.

Control for the 2246S workstation comes from the 22V07 workstation IOP, which reportedly supports any combination of up to 16 serial workstations or printers while operating as far as 2,000 ft away. The workstation itself costs $3,200, while eight-port and 16-port versions of the accompanying IOP sell for $3,000 and $4,000 respectively.

Another recent VS series addition, the 2209V-2 tape transport unit, reads and writes at 75 in./sec and rewinds at 200 in./sec, the spokesman said. Capable of storing 800- and 1,600 bit/in., the 9-track unit provides read-after-write verification, automatically corrects single-track errors and comes with the 22V05-2 tape system IOP, which supports up to four 2209V-2s simultaneously.

The 22V05 costs $4,000, compared with $16,000 for the dual-density transport system.

Rounding out the latest VS line introductions, the 2256 series serial interface allows users to connect their VS processors to any other 2200 series CPU, including the MVP, T and VP versions, the spokesman said. The interface costs $1,200.

Desktop Unit Enhanced

Elsewhere in Wang's 2200 series product line, the PCS-IIA incorporates a processor with a Basic interpreter, 8K bytes of user-addressable memory expandable to 32K bytes and 42.5K bytes of operating system memory.

Like the PCS-II from which it was derived, the latest addition to Wang's desktop computer family provides 89.6K-byte diskette units, a 1,024-char. CRT screen, keyboard with numeric keypad and 23 special function keys for data entry and system control.

Unlike its sister system, however, the PCS-IIA offers no multiprinter option. Instead, the system replaces that feature with a disk multiplexing capability which permits the desktop unit to share a data base with larger host processors, the spokesman explained.

Users can upgrade the PCS-II to the PCS-IIA in the field merely by inserting the appropriate multiplexer boards, he added.

Slated to become available by the end of this month, the PCS-IIA costs $4,800 for a minimum configuration.

The MVP-A chassis, meanwhile, incorporates a built-in power supply and must be configured with all subsequent 2200MVP orders calling for a 2280 disk system and more than 64K bytes of central memory, the source said. The chassis costs $500 and, like all of Wang's other recent hardware additions, is available from the vendor at One Industrial Ave., Lowell, Mass. 01851.

“I can give you ten reasons [illegible]
OMEGA 480 is the better [illegible]

“First of all, there's the *price*. Our OMEGA 480-1 has greater *throughput* than a 370/138—yet it costs about the same. [illegible] our 480-11 exceeds 370/148 performance but costs substantially less!

“And an OMEGA 480 system requires [illegible] one quarter the *power* and one half the floor *space* of the comparable 370.

“Of course we designed it to be [illegible] *upgradable*. That means you [illegible] the smaller OMEGA 480-1 now and upgrade to the larger processor [illegible] your needs require the higher performance.

“And there's software. OMEGA [illegible] without modification, most IBM [illegible] systems, program products and [illegible] programs.

“Financing can be important, too. [illegible] attractive options are available [illegible] *Installment Sales Plan* or from [illegible] of 3- to 7-year *leases*.

“But most importantly is the *service*, *experience* and *support* you want. You [illegible]

Mini Sends Druggist Home Without Paperwork at Night

(Continued from Page 61)

for LeQuatte Pharmacy has been accurate recordkeeping.

"It does our label typing, our patient profile recordkeeping and our third-party billing as well as accounts receivable," he explained. "For the first time, at the end of the day I can be totally finished instead of having someone take the paperwork home to figure the public aid and write the third-party billing. I know when that prescription is filled that everything is done."

Before the mini's acquisition, LeQuatte's business had grown to the point where he needed new personnel. The computer alleviated that need, he recalled. "If I had been working with the proper number of personnel, I would have been able to cut back on people."

Family Profiles

LeQuatte Pharmacy's data base contains a profile of each family he supplies with prescriptions. When a patient brings in a prescription to be filled, the pharmacist dials a telephone number to access the individual's family profile, which indicates each patient's identification (ID) number.

By inputting the patient ID number and pushing the "Transmit" button, the pharmacist retrieves a "drug entering screen" on a CRT terminal. Using mnemonics, he then enters a drug name and dosage amount, the number of refills available to the patient, the doctor's initials or three letters of his name and the directions for the patient.

"The machine produces a label automatically, prices the prescription and prints a receipt. And - zap! - it's ready to bill on a billing dump at the end of the day," LeQuatte said.

An added benefit of the system is a doctor-developed drug-to-drug interaction program. "If there are two drugs that will interact unfavorably or if a patient has an allergy to a certain drug, a message will appear on the screen," LeQuatte explained.

'Downgrade' Planned

LeQuatte's configuration consists of a 64K-byte Honeywell Level 6 Model 33 minicomputer and two 10M-byte disk units offering 5M bytes of fixed and 5M bytes of removable storage. That equipment, installed in late August, will be "downgraded" later this month to a Model 23 mini and a 16M-byte cartridge disk unit with 8M bytes of fixed and 8M bytes of removable storage, according to Richard [illegible], president of GCC, which will install the replacement system.

The Model [illegible] and pro[illegible] LeQuatte's application requires and is not part of the package offered by GCC.

It sufficed at the LeQuatte Pharmacy, however, until the Model 23 became available.

LeQuatte's configuration also includes a 120 char./sec printer and two Honeywell VIP 7200 CRT terminals in contrast to the GCC package, which provides just one terminal.

The only problem LeQuatte has experienced with the equipment involved a faulty disk unit, which Honeywell people fixed. "They don't know to this day whether [the problem] was caused by something in shipping or whether something was manufactured improperly," LeQuatte said.

RAISED FLOORS
- New & Used
- Bought-Sold-Installed
- Alterations-Carpeting
- Carpet Applied on Site
- Parts & Service

CALL
201-891-2766 212-244-3100
R.C. PULIS
ASSOCIATES, INC.

Box 102
Wyckoff, N.J.
07481

2 Penn Plaza
New York City
10001

Diskette for Micros Offers Double-Density Recording

TORRANCE, Calif. — A 5.25-in. diskette that uses double-density recording to hold up to 200K byte/surface reportedly forms the heart of a minifloppy disk unit from Vista Computer Co.

In addition to the hard-sectored recording medium, the V200 diskette system incorporates a disk drive, a dc power regulator board, internal power supply, I/O cable and S-100 bus controller card that supports up to three double-density, double-sided drives, according to a Vista spokesman.

Capable of operating with any 24K-byte Zilog, Inc. Z-80 or Intel Corp. 8080-based system, the V200 also provides system software consisting of Digital Research, Inc.'s CP/M disk operating system and a choice of either a standard Basic E compiler or an optional CBasic compiler.

With the CP/M operating system, users can store up to 64 dynamically allocated files on one diskette, the source noted.

Other features reportedly available with the V200 include program loading and dumping.

A V200 package, including hardware and software documentation, costs $699 and is available from Vista's Department P2, 2807 Oregon Court, Torrance, Calif. 90503.

OUTPUT CONTROL.

How Honeywell's Page Printing System consolidates the work of as many as six impact printers—

and associated punches, perforators, cutters, collators, stackers, and addressing machines.

In-House Beats T/S Costs

Ship Designer On Course With Mini System

GALVESTON, Texas — "We were totally dependent on a system completely out of our control. Our time-sharing cost alone was from $5,000 to $6,000 per month per job. The cost was high enough to prohibit future application development, unless required by contract."

With those words, Dennis K. Medler, director of computer-aided design at a ship engineering firm, explained why his company switched about a year ago from a batch-oriented service bureau to an in-house, interactive minicomputer system.

Under the time-sharing service, the firm — Designers & Planners, Inc. — used a numerical control (NC) system to design and build parts for vessels ranging from sailing yachts and tug boats to destroyers and tankers. Known in the shipbuilding trade as "lofting," the ship-designing process consists basically of drafting a preliminary structural blueprint and then converting that design into templates, or molds, from which finished ship parts are eventually produced.

But when control problems and excessive costs made the service bureau no longer suitable for lofting, Designers & Planners analyzed the available small- to medium-scale computer systems and selected a Model 400 system from Prime Computer, Inc.

Power, virtual memory and ease of operation were the factors in the system's selection, Medler said. "We needed a system large enough to easily convert our large programs with no segmentation. Prime's operating system was flexible enough to let us merge our entire program — up to 50,000 lines of code for one scientific application alone — with no overlays and no segmentation," he added.

Conversion took only half of the expected 10 months, largely because of the system's Fortran software which proved "easy to work with," Medler said.

Besides the 512K-byte CPU, the Model 400 system incorporates a 356M-byte disk unit, 600 line/min printer, 300 card/min [illegible] Perkin Elmer Corp. [illegible] paper tape reader [illegible]

[illegible] has [illegible] Designers & Planners to add [illegible] we never [illegible] capability [illegible]

[illegible] all the [illegible] the N[illegible] [illegible] This [illegible] would [illegible] computer lofting [illegible]

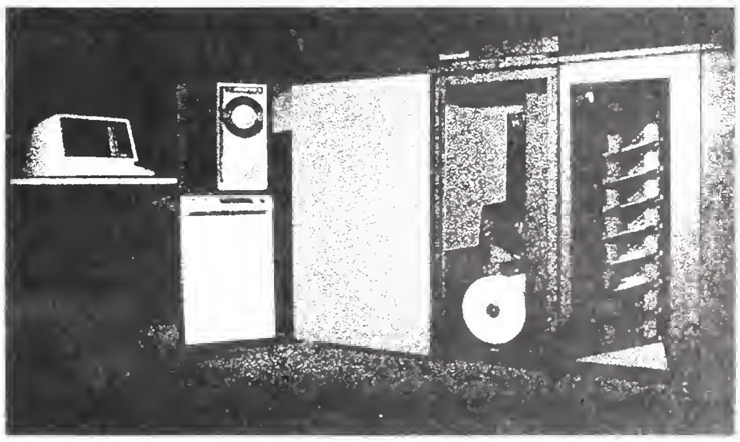
Norwegian Software

Designers & Planners [illegible] Autokon 71, a shipbuilding software system developed in Norway [illegible] lofting contours, augmented [illegible] design parts and production parts. A complete geometric description of each part is stored to create a data base from which the firm can ultimately make nest-burning tapes [illegible] efficient use of [illegible] on [illegible]

Using the Autokon 71 program [illegible] Prime system, the ship[illegible] [illegible]

[illegible] drawings [illegible]

[illegible] NC [illegible]



With our system, you get the advantages of total performance without bottlenecks. And users get better finished products without delays. Because Honeywell's non-impact Page Printing System continuously delivers more original copies at higher speeds with increased flexibility and greater cost control.

In fact, at printing speeds of up to 600 pages per minute, our systems are producing as many as four million pages per month for companies in industries like manufacturing or distribution, banking or finance, government or education, and insurance or services. And they do all this with output from IBM, Burroughs and Univac, as well as Honeywell computers.

Quality Control.

That's not all. Our system not only prints variable data, but also prints the forms and punches, perforates, collates, and stacks the pages. Each printed character is crisp, clean, and sharp. Every line is true and even. Each page is an original without carbons, smudges, or diminished quality. Which gives you more satisfied users than ever before.

And our system lets you choose the form size, type font (with upper and lower case), hole punching, color, selective blanking or suppression, and individual addressing or routing.

Cost Control.

What all these advantages give you is a sure way to control the mounting costs of hardware, personnel, and forms and inventory. And, at output rates of at least 400,000 and as many as 4,800,000 pages a month, a single Honeywell Page Printing System can meet the most demanding needs.

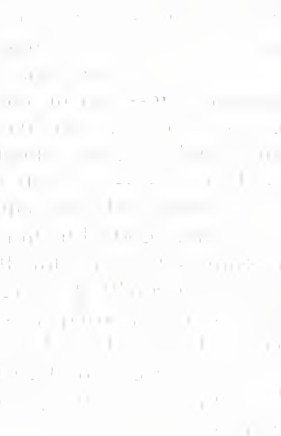
Performance Control.

So, if you want increased throughput, improved quality, cost efficiency, and more flexibility than you've ever had before, consolidate your efforts towards consolidated control. With the Honeywell Page Printing System.

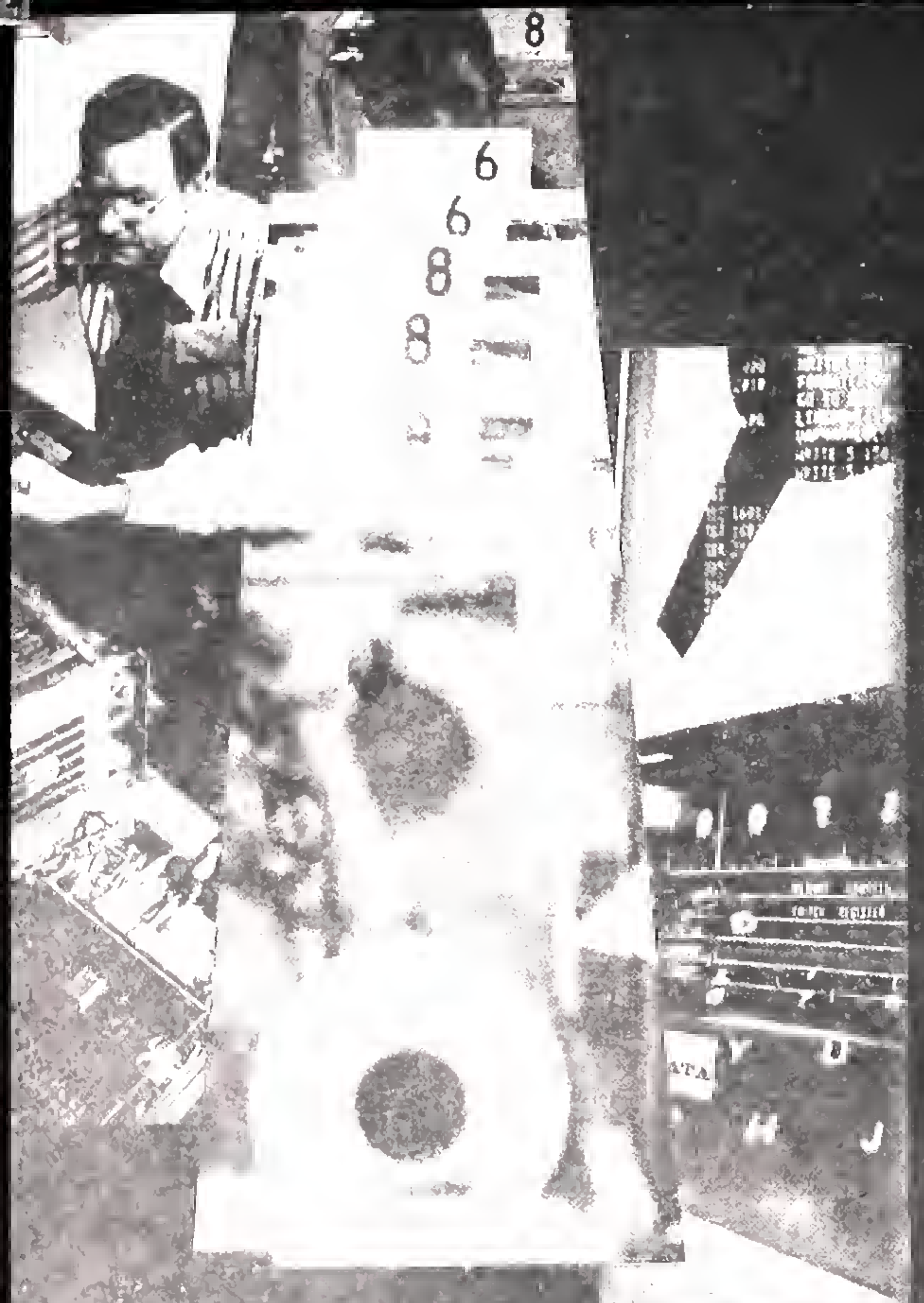
For more information, write Honeywell Information Systems, 200 Smith Street (MS 487), Waltham, MA 02154.

Honeywell

OMSI PASCAL-1
All PDP-11s [illegible]



[illegible] RSX-11 [illegible]



sales

sales representatives

Interdata offers highly marketable products with an excellent reputation for performance, reliability, and economy. Higher earnings through our special "no-ceiling" commission plan. And strong technical support. As for growth opportunities, let Jim Sims, our National Sales Manager, tell that story.

"I joined Interdata in January, 1974 as a sales representative, was promoted to District Manager in June, 1976, then to Regional Manager in July, 1977, and to National Sales Manager in June, 1978. And I'm not an isolated case. All four of my Regional Managers were promoted up through the ranks. In the last six months, we promoted 2 National Accounts Managers and 5 District Managers from our sales force."

For full information about how you can become a member of our sales team, contact the Interdata Regional Sales Manager in your area.

NORTHEAST REGION
Den Roberts
2 Crescent Place
Oceanport, NJ 07757
(201) 229-4040

SOUTHEAST REGION
Tom Dunn
1764 Old Meadow Lane
Polk Building, Suite 1
McLean, VA 22101
(703) 827-5900

CENTRAL REGION
Homer Thornlon
13771 North Central Expressway
Suite 624
Dallas, TX 75243
(214) 234-8880

WESTERN REGION
Don Reclor
17461 Irvine Boulevard, Suite 5
Tustin, CA 92680
(714) 544-9093

sales support

systems analysts programmer analysts

Interdata manufactures an outstanding line of advanced 16- and 32-bit minicomputers using high-level languages that include BASIC, FORTRAN, ASSEMBLY, COBOL, CORAL, MACRO CAL, and special off-the-shelf packaged systems.

To keep pace with our sales growth we are seeking systems analysts and programming analysts with 2-3 years experience with minicomputer systems and interfacing with customers and conducting presentations involving benchmarks and standard test runs. Our salespeople recognize the importance of pre- and post-sales support provided by our analysts.

If you are seeking opportunities to make the most of your training and experience, contact the Interdata Software Services Regional Manager to discuss analyst positions available in that area.

NORTHEAST REGION
Den Broenahan
2 Crescent Place
Oceanport, NJ 07757
(201) 229-4040

SOUTHEAST REGION
William Duce
1764 Old Meadow Lane
Polk Building, Suite 1
McLean, VA 22101
(703) 827-5900

CENTRAL REGION
Ted Gillem
13771 North Central Expressway, Suite 624
Dallas, TX 75243
(214) 234-8880

WESTERN REGION
David Reed
Hearst Boulevard, Suite 320
Third and Market Street
San Francisco, CA 94103
(415) 543-2863

service

customer service engineers

Interdata microprogrammed minicomputers combine a powerful architecture with the latest advances in practical large-scale integrated circuit technology. Even in the initial design phase of our products, we take the needs and problems of our service engineers into consideration and strive to create systems that are easily maintained. We not only keep up the technical skills of our Customer Service Engineers through training, but we also recognize the importance of their maintaining good customer relations.

If Interdata sounds like the kind of systems you'd be proud to service, contact the Interdata Hardware Services Regional Manager to discuss openings available.

EASTERN REGION
Stan Hutt
140 Sylvan Avenue
Englewood Cliffs, NJ 07632
(201) 947-2200

NEW YORK METROPOLITAN REGION
Richard Geidel
77 Water Street
Eighteenth Floor
New York, NY 10005
(212) 483-0240

MID-WEST REGION
Mike Stelzer
415 West Golf Road
Arlington Heights, IL 60005
(312) 439-8067

SOUTHERN REGION
Pierre Fo[illegible]
13771 North Central Expressway
Suite 701
Dallas, TX [illegible]
(214) [illegible]

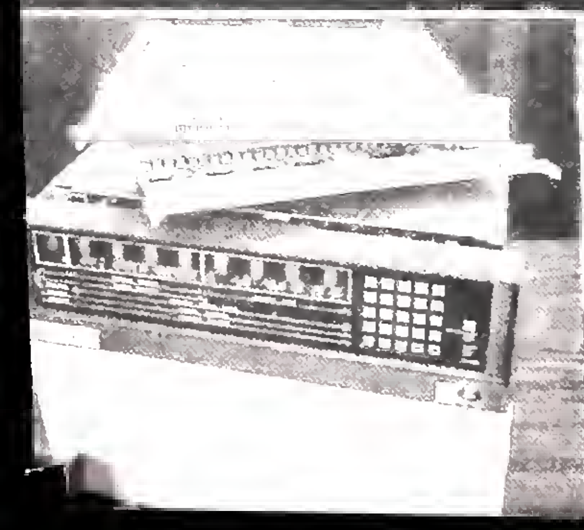
WESTERN REGION
[illegible]
11222 La [illegible], Suite 666
Inglewood, CA [illegible]
(213) 641-[illegible]

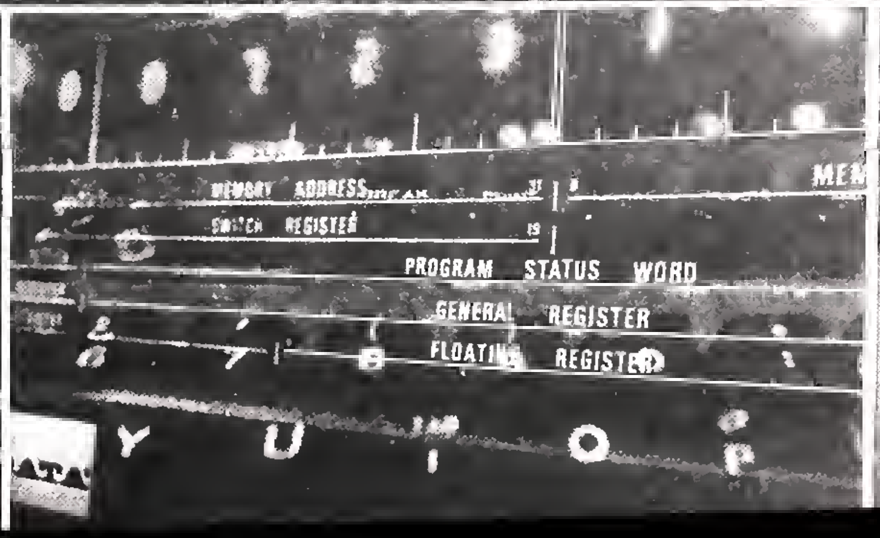
opportunity...growth...recognition...challenge

PERKIN-ELMER

Interdata Division

Computer professionals unable to contact our Regional Managers, or who wish additional information on these or other career opportunities throughout the country in any of the above disciplines, should contact: William C. Beattie, Jr., PERKIN-ELMER, Interdata Division, 106 Apple Street, Tinton Falls, New Jersey 07724. OR CALL COLLECT: (201) 747-7300. An equal opportunity employer M/F





Mini Points Out Excess

Distributor Cuts Surplus Stock by $100,000

MEDFORD, Mass. — A chemical distributor here cut $100,000 of inventory surplus after a minicomputer-based system helped uncover that much excess stock.

"In fact, one of our major vendors thought we were giving up his line when we dropped from a truckload per week to one every three weeks," the firm's president, Larry Liebman, recalled.

The user, Doe & Ingalls Inc., previously used a card-based inventory control system to keep track of the 2,300 different items stocked in the firm's 24,000 sq-ft warehouse. But with 50 to 60 orders and several hundred items being shipped each day, the firm eventually encountered difficulties with the manual system.

Though basically adequate, the system entailed so many control steps that Liebman's office staff of five could not keep up. With a goal of one-day service to 50% of Doe & Ingalls' more than 600 regular customers, the manual system simply fell short of expectations.

It was generally assumed to take three weeks to restock after orders were placed with a vendor but, in practice, up to three months frequently elapsed between the order and resupply.

For this reason, Liebman's biggest problem was "not knowing what we had out on the floor. Some items were overstocked while others were sold out."

Because there appeared to be no simple way to expand the card system to meet the company's needs, Liebman decided to automate not only to meet his immediate needs, but also to realize his projected goal of doubling sales within three years.

Three-Month Search

Hoping to find a ready-made inventory control package, Liebman spent more than three months evaluating products from IBM, Digital Equipment Corp., Litton Industries, Inc., NCR Corp. and Wang Laboratories, Inc. While all the systems were competitively priced, most lacked the flexibility to work within the context of Doe & Ingalls' manual system and required new procedures and forms, Liebman noted.

So the Wang system got the nod when Liebman learned it could be programmed to identically match Doe & Ingalls' manual records and systems.

"The other computer manufacturers wanted us to change our forms, the way we did things, the way we obtained our reports," Liebman said. "With Wang, we didn't have to change anything when we computerized."

Last January, Liebman installed a Wang minicomputer system with customized version of the manufacturer's General Business System (GBS) software package, acquired through Data Processing Services, Inc. Doe & Ingalls' package not only controls inventory, it also prints orders and shipping documents, writes invoices and prepares management reports.

When an order is received, data is taken over the phone and logged onto a standard form. Order entry data includes customer number, product number, discount code and quantity.

Keying the product number into the machine summons a CRT dislay depicting case price and cost, unit selling price and unit cost, chemical nomenclature and package type and size. With such information, the system prints an order with appropriate prices on a four-part carbon form. Shipping and picking papers are generated as part of the same package.

Doe & Ingalls' system consists of a 32K-byte Model 2200 CPU, a 10M-byte disk unit, 240 line/min printer and one CRT terminal.

During most of a typical working day, the machine is available for taking orders as they are phoned in. Between order entries, operators do a number of other functions such as posting cash, inventory control or receivables accounting.

The opening and closing periods of each business day are devoted to DP tasks like the production of daily invoices. The invoicing that used to occupy one staff member full time is now completed in 80 minutes, Liebman noted. During these periods, the system also writes invoices, generates back orders, completes the invoice register, updates sales analyses and generates a commission report.

At month's end, the system prepares a sales report listing customer-by-customer profit margins and supplying sales activity for the month- and year-to-date, he said.

With the modified GBS software, Liebman can display the last 21 transactions for any given product — a feature from which an average demand can be computed for purchasing and stock forecasting.

Data for Clients

The system also selectively prints quarterly sales activity reports that show customers what they have purchased from Doe & Ingalls.

In addition, it retrieves by product a listing of buyers for any given period. "This is of vital importance when a manufactuer issues a product recall," Liebman pointed out.

While Liebman finds it difficult to assign a dollar value to his mini's performance, he claimed that much of its value lies in "the ease it has created in the office and warehouse, as well as the increased comfort and boost in morale" because the atmosphere is no longer rushed and hectic.

Liebman does not foresee an immediate need to expand the system. "We can do three or four times the business with this machine and not have to change it," he said.

The Way to Better Systems and Program Design

Infotech Data Structured Design Technology

Infotech Data Structured Design Technology is a method for producing systems and programs from requirements specifications. It ensures that the user achieves the right systems and programs for his needs —on time, every time.

Infotech Data Structured Design Technology is a highly disciplined method that is capable of being applied to all types of application —large, small, batch, on-line, process control, database — and it is specifically designed so that it can be taught at all levels of system designer and programmer experience.

Thousands of users of this method throughout the world have found that it results in them:

- having complete confidence that systems and programs are going to work first time
- being able to see what a system or program will do before it is run
- knowing precisely what stage of design or programming a particular project has reached
- knowing how much work a change to the specification is going to require
- being fully fully confident that any programmer or analyst can take over the work of any other, and understand it exactly
- being able to code a completed program in any programming language and still be sure it is going to be correct

TRAINING SCHEDULE

Infotech Programming Technology: 3-day Overview			
San Francisco	Dec 18-20, 1978	Washington, D.C.	May 9-11, 1979
Los Angeles	Feb 28-Mar 2, 1979	Chicago	June 18-20, 1979
Infotech Programming Technology Workshop: Week 1			
San Francisco	Dec 4-8, 1978 Jan 15-19, 1979	Washington, D.C.	May 14-18, 1979
	Mar 12-16, 1979	Chicago	April 2-6, 1979 June 4-8, 1979
Los Angeles	Feb 5-9, 1979		
Infotech Programming Technology Workshop: Week 2			
San Francisco	Dec 11-15, 1978 Feb 12-16, 1979	Washington, D.C.	June 25-29, 1979
April 23-27, 1979	April 23-27, 1979	Chicago	May 21-25, 1979 June 11-15, 1979
Los Angeles	Mar 5-9, 1979		
Infotech Systems Technology: 10-day Workshop			
Chicago	March 26-April 6, 1979	New York	Sept 17-28, 1979

IMPORTANT: All courses also available at your own site. Write or phone for details.

Register NOW to be sure of places

Registration: Choose from these IPT/IST Workshops:

Company Organization ____________

Full Mailing Address ____________

Registration placed by (name dept. phone) ____________

Course, dates and location | Delegate's last name, initials, job title | Fees

For immediate confirmation of registrations, call Dee Coffeen on (213) 793-0687

Fees:

IPT 3-day Overview	$450	IPT Workshop: Weeks 1 and 2 booked at same time	$1,200
IPT Workshop Week 1	$625		
IPT Workshop Week 2	$625	IST 10-day Workshop	$1,650

Infotech International Incorporated

234 E. Colorado Blvd., Pasadena, California 91101 Telephone (213) 793-0687

Synthesizer Based on MPU

Portable Unit Offers Speech to the Mute

By Ann Dooley
CW Staff

E. LANSING, Mich. — Victims of stroke or cerebral palsy and other people unable to speak clearly can now be helped to talk — some for the first time in their lives — through a portable, microcomputer-controlled voice synthesizer system.

The unit, which is reported to be the first of its kind, can be attached to a wheelchair so its user does not have to remain stationary or near a DP center or computer room. "That is the beauty of using a microcomputer system — it allows the user to move around at will," John B. Eulenberg, professor of computer sciences and linguistics at Michigan State University (MSU), pointed out.

Eulenberg, who is co-director of the MSU Artificial Intelligence Laboratory, designed the portable system in cooperation with Prof. Morteza Rahimi. The system was developed for James Renuk, an MSU student who has cerebal palsy and cannot command his vocal tract to produce speech.

Although the system is being tested only by Renuk at the present time, a plan is being formulated to use the system to help similarly handicapped pupils in a number of Michigan schools.

The "talking computer" is actually a Handivoice portable speech synthesizer from Federal Screw Works. Controlled by a Motorola Corp. 6800 microprocessor, the Handivoice incorporates Federal Screw's Votrax audio response system.

The system allows the user to access an indefinite number of pages of information through a 17-key keyboard. A modified Heath Corp. Heathkit TC3400 microcomputer incorporated in the system interfaces with specially designed read-only memory (ROM) and uses the 6800 language.

The system utilizes 16K of erasable programmable read-only memory (Eprom) with a Model 2716 Intel Corp. chip. The synthesizer uses 8K of ROM and the system itself rises 16K of ROM to operate.

(Continued on Page 72)

Jim Renuk, a Michigan State University senior in food science from Westland, Mich., uses his portable voice synthesizer system in a conversation with John B. Eulenberg, professor of computer science and linguistics. Renuk has cerebral palsy and cannot speak.

Digitenn's Options Now Standard

UNION, N.J. — Tenney Engineering, Inc. has made several previously optional performance features into standard features on its Digitenn microprocessor programmer.

The changes include 51 program segments that permit a lengthy, nonrepetitive program cycle with programming up to 51 steps, seven event switches offering time-related switch closures, a battery backup system and compatibility with teletypewriter tape or other Ascii input.

Digitenn now also offers a standard power-on program-erase switch that permits total shutdown and optional compatibility with an IEEE bus.

The cost of the Digitenn has not been increased with the addition of these features. A single-channel Digitenn costs $1,575 and a dual-channel version costs $1,875.

Digitenn is a digital display push-button microprocessor programmer that automatically signals environmental test chamber controls to perform time-related temperature, humidity and altitude programs as a one-parameter test or to perform any two parameters simultaneously.

Tenney Engineering is at 1090C Springfield Road, Union, N.J. 07083.

Controller Links Disk, S-100 Bus

PHOENIX — The SMC 100 controller now available from Konan Corp. interfaces storage module technology disk drives to microcomputer systems based on the S100 bus.

Using the SMC-100, 64K bytes of data can be transferred in less than 350 msec because of a direct memory access scheme used on the controller, the firm said. Data is transferred in blocks using two machine cycles per byte.

Each sector is fully buffered on the controller to eliminate disk and CPU timing restraints, according to the firm.

The controller uses I/O commands for all functions. A driver and IPL read-only memory (ROM) is available which, when accessed with descriptors, performs the indicated disk operations along with automatic error recovery and multiple sector transfers.

Data Integrity

Data integrity is assured by automatic cyclic redundancy check (CRC) generation and checking. The SMC-100 can be used with or without formatting. If the onboard ROM driver is used, the format generation and checking is transparent to the user.

Each controller can accommodate up to four drives providing 14M to 1.2G bytes of storage. The SMC-100 costs $1,650 from Konan at 1434 N. 27th Ave., Phoenix, Ariz. 85009.

Eight Colors Available

DOTHAN, Ala. — Intercolor Corp. is offering the 8070 Series I business system, which incorporates a 19-in. CRT screen with eight background colors and a separate keyboard with 192 codes with an 8080A MPU featuring 15K bytes of read-only memory and 16K bytes of random-access memory.

The system has keyboard-selectable transmission rates of 110- to 9,600 bit/sec, a 48-line screen format with 80 char/line, one RS-232C serial port, bidirectional impact matrix printer and dual 8-in. floppy disk drive with 591K bytes.

The system runs under Microsoft Business Basic and a payroll program can handle up to 500 employees, the firm said.

The 8070 costs $7,000 from Intercolor Corp., Suite 4 112 North Bell, Dothan, Ala. 36303.

Centronics carry-in service centers save you a lot more than time.

Centronics already has six carry-in service centers coast to coast with more on the wa
And that can save you both time and money. For full details call today. *Toll free*
1-800-258-1952. Or write Centronics Data Computer Corp., Hudson, NH 03051.

CENTRONICS® SERVICE
Simply Better

8002 Users Offered Fortran-80

ALBUQUERQUE, N.M. – Tektronix, Inc. 8002 users can now take advantage of Fortan-80 from Microsoft, Inc., which now operates under the Tektronix Disk Operating System (Tekdos).

The Fortran-80 package allows development and debugging of programs written in Fortran on the 8002 microprocessor development system. The compiler can be used to develop 8080A systems that employ the Intel Corp. 8080A, 8085A and Zilog, Inc. Z80 chips.

The Fortran-80 compiler is accompanied by an assembly language development package that includes a relocating assembler and linking loader. Object code is generated in binary relocatable modules which can be linked to separately compiled Fortran or assembly modules.

The Fortran-80 compiler for the Tektronix 8002 costs $500 from Microsoft, Suite 819, 300 San Mateo N.E., Albuquerque, N.M. 87108.

OSI Users Get Group

NEWTON, Mass. – Owners and all those interested in Ohio Scientific Inc. (OSI) microcomputers can share information, applications and software through an independent group formed by the Newton Software Exchange.

Many owners experience the same problems and make the same mistakes, and this group hopes to help users avoid many of those difficulties, according to Jack C. Star, president of Newton Software.

Annual dues are $5, which includes a monthly newsletter from P.O. Box 518, Newton, Mass. 02158.

Utility Supports TRS-80

FULLERTON, Calif. – Faulk & Associates Software is offering a utility called SEQDMP that will reportedly read and dump any track and sector on the TRS-80 minidisk.

The program will dump both hexadecimal and Ascii using 16 bytes across, grouped into 4-byte increments. The program can be used to dump the directory, files or random tracks and sectors and will bypass any password protection that may be placed on a given file, the firm said.

The program requires 2K of memory and will run on a machine with at least 16K.

SEQDMP can provide hard copy if a printer is attached and it is ready when the program starts to format a sector. It uses its own disk access code, so it is independent of disk operating system releases.

SEQDMP costs $15.95 (with a 6% sales tax for California residents) from Faulk & Associates Software, 2531 E. Commonwealth, Fullerton, Calif. 92631.

Talking System Built

(Continued from Page 71)

The unit is programmed with three modes of speech: whole phrases, individual words; and sounds, or phonemes. This phrase book of language is placed on a ROM and includes nearly 1,000 stored words, phrases and sounds.

Symbols Translated

The Heathkit microcomputer is programmed to access sequences of these words and transmit them to the voice synthesizer so Renuk can communicate.

According to Eulenberg, the system has the ability to construct long and involved sentences and words. If a word is not included in the stored dictionary of words, the system can construct the word by putting the correct sounds together.

To use the system, Renuk punches a symbol on the keyboard into the microcomputer, which is programmed to decipher the code. The system then translates the symbol into matching audible sounds using the Handivoice.

The system works very well, according to Eulenberg. Research is now concentrating on speeding up the rate of speech.

The automated processing of the sounds takes only seconds, but the rate of speech is dependent on how fast the user can construct the words going into the buffer so they can be sent out in vocal speech patterns, he explained.

In order to speed up the speech process, the physical interface – in this case the keyboard – must be modified so it will be easier to operate. Artificial intelligence research will ideally progress so a system can anticipate what the user is about to do and "navigate in language space," Eulenberg said.

Although the speech is slow and sounds "unhuman," it does give people who never before had an opportunity to communicate a way to speak, Eulenberg said. Most people with speech problems attempt to communicate in writing and unless the recipient has knowledge of the problem, communication is difficult.

Most of the developmental research was performed on a Control Data Corp. 6500 system. Many of the programs were written by a member of the MSU research staff who is also handicapped. Much of the work was done by Jerome Jackson, a blind programmer and Renuk, the student who is unable to talk. The whole thing worked beautifully, Eulenberg said.

Renuk recently demonstrated the system at a U.S. Governmental Interagency Conference in Washington, D.C. This marked the first time such a communication system was used to deliver an extended speech and it went over very well, Eulenberg said.

Before converting to the Motorola system, the MSU lab used an Electronics Products Associates, Inc. 68 microcomputer with a Votrax VS-6 voice synthesizer that had to be plugged into the computer room wall, limiting movement.

Bored with Board

When Renuk was outside the room, he carried a language board consisting of about 100 words and phrases to which he would point in order to be understood. This was extremely cumbersome, however, and taxed both Renuk and the person with whom he was attempting to communicate, Eulenberg said. It took about a year and a half before the portable system was developed.

Although few research centers around the country are currently engaged in this kind of research, it is a growing field, Eulenberg said.

One line of research seeks to find ways of using electric signals to determine muscle activity and then using a microcomputer for pattern recognition and reconfiguration by recognizing different muscle signals. The user would only have to think about moving a muscle to activate the muscle neutrons and thought processes, which the system could pick up and convert, he said.

10 SIMPLE STEPS TO CAREER ADVANCEMENT:

305-727-0660

DBA SYSTEMS, INC. can offer exciting career assignments to professionals with skills in Photogrammetry, Digital Imaging Systems, Software design, Systems Engineering, and Programming. Call us **COLLECT** and ask about the good life on Florida's spacecoast

DBA
systems, inc.
PO Drawer 550
Melbourne, Fl. 32901

an equal opportunity employer
male/female
U.S. Citizenship required

Judge Won't Dismiss Charges

CFI Suit Against Decimus Still Stands

By Marcia Blumenthal
CW Staff

NEW YORK — A federal judge here has refused to dismiss claims brought by Computer Finders, Inc. (CFI) last April against Decimus Corp., a subsidiary of Bankamerica Corp., and two of its senior executives.

At the heart of the suit are CFI claims that John Margoes, Decimus president, and John M. Mickel, executive vice-president, deliberately started an investigation into vague allegations of bribery on CFI's part and used those allegations as an excuse to cease paying monthly contract fees to CFI.

The suit charges Margoes with starting the investigation because he felt that CFI was too small a company to be collecting the amount of fees agreed upon in written contracts between the two companies.

Since the action's filing, Mickel has become a senior vice-president of the Bank of America, according to court documents.

CFI is a small leasing company whose specialty is arranging the leasing and subleasing of computers. Decimus is also in the leasing business and its various leasing programs involve computers worth more than half a billion dollars, the suit stated.

Between 1974 and 1976, according to the complaint, CFI arranged a computer leasing program in which General Electric Credit Corp. (Gecc) agreed to purchase up to $200 million worth of new IBM computers which were to be leased to Decimus and [illegible] by Decimus to other companies. G[illegible] agreed to pay Decimus a monthly [illegible] administration fee for each sublease [illegible] mus arranged.

In January 197[illegible], the suit contain[illegible] mus and CFI entered into [illegible] under which Decimus agre[illegible] origination fee and an ongoing fe[illegible] lease negotiated. CFI had certain [illegible] participate in the remarketing of the [illegible] puters once the lease expired, according [illegible] one of the suit's claims.

Fee Payments Stopped

A total of 17 computer subleases [illegible] ecuted under the Gecc program with Decimus as sublessor and various other [illegible] nies as sublessees. Decimus paid CFI [illegible] fees agreed upon in their written [illegible] until about August 1977.

Last April when the complaint [illegible] cimus was filed, Decimus had not [illegible] since August 1977. As of Nov. 1 [illegible] due CFI from Decimus exceeded [illegible] the suit contended.

Just prior to the cessation of payments to CFI, according to the CFI filing, Decimus informed CFI it was conducting an investigation to find out whether "improper payments" had been made by CFI to certain Decimus employees in connection with the negotiation of the Gecc program. The investigation was prompted by a Decimus employee's statement that key Dec[illegible]

(Continued on Page 84)

Revenue Act Expected to Bring Capital to Technology Firms

PALO ALTO, Calif. — The recent signing of the Revenue Act, which reduced the maximum capital gains tax from 49% to 28%, is expected to result in an infusion of capital for high-technology firms, according to members of the American Electronics Association's (AEA) capital formation task force.

However, the reduced capital gains taxes will cause an estimated $2 billion shortfall in net capital gains tax revenue, according to estimates of the U.S. Congress' Joint Committee on Taxation.

The government's figures are based upon the consensus that about $3.8 billion in reduced tax revenue from tax cuts would be offset by about $1.8 billion in additional tax revenue gained from new capital formation.

However, the AEA thinks the revenue loss will not be as high as government figures indicate. According to an AEA-commissioned study made by Chase Econometrics, tax revenue gains and losses would just about even out with the maximum capital gains tax rate at 25%.

In commenting on the Revenue Act, Dr. Edwin V.W. Zschau, chairman of Systems Industries, Inc. and head of the AEA capital formation task force, said AEA is encouraged by the government's growing recognition of the necessity of stimulating risk capital investment.

"Until this year, Congress did not understand the connection between risk capital investment and job creation," Reid W. Dennis, a venture capitalist and AEA task force member, noted.

Dennis also pointed out that AEA's testimony at congressional committee meetings concentrated on showing members of Congress that young, high-technology companies generate jobs at a much faster rate than more mature companies.

AEA's survey showed that it takes

(Continued on Page 84)

Technology Transfer Service

Technotec Sale to Soviets OK'd

By Marcy Rosenberg
CW Staff

MINNEAPOLIS — Control Data Corp. recently received U.S. government approval to make available its computer-based technology transfer service, Technotec, to the USSR, Eastern Europe and Yugoslavia.

Under a license agreement with the U.S. Department of Commerce, CDC will provide the Technotec data service from a CDC Cyber 172 computer located in Brussels, according to Robert D. Schmidt, executive vice-president. The computer will not be connected to any other system, ensuring that users access only Technotec data and no other information.

The U.S. Commerce Department stipulated that users not be able to interface directly with the computer, that it receive reports of each transaction within 60 days and that no data be contained in the data base that would require a validated U.S. license for transfer.

Users will be able to request information through a terminal connected over telephone lines to CDC's Brussels [illegible] where a CDC western representative will screen the request, query the [illegible] and transmit the information to the user terminal.

(Continued on Page [illegible])

TI745
743
765
810

DAS, the single source for trouble-free telecommunications. Nationwide.

With fully-stocked branch offices located from coast to coast, DAS, the nation's largest independent supplier of terminals, has the facilities and capabilities to provide instant, off-the-shelf delivery, sophisticated applications assistance, and super, on-site service at the lowest possible cost.

You save time and trouble with our free, 90-day warranty, available on over 30 state-of-the-art products from DEC, Diablo, Lear Siegler, and Western Telematic. This unique protection plan covers not just the terminal, but every systems component we sell. So, whenever you need service there's only one reliable source to call. DAS computer-dispatched technicians arrive on-site within one working day or less.

So, join the over 3,000 users throughout the country who depend on Data Access Systems, the single source for trouble-free telecommunications. For information on economical lease or purchase plans or details on a complete range of supplies call your local district office or toll free: (800) 631-9604 or 9605

DAS
THE DATA TERMINAL PEOPLE

Data Access Systems, Inc.

Corporate offices
100 Route 46, Mountain Lakes
N.J. 07046 • (201) 335-3322
or toll free (800) 631-9604

District offices Boston Area — [illegible] • Washington, D.C. Area — 703 569-7711 • Phila. So. Jersey Area — (609) [illegible] • Chicago Area — 312 967-0440 • Los Angeles Area — [illegible] • San Francisco Area — (415) 692-5[illegible] • Cleveland Area — [illegible]

U.S., IBM Trying 'Narratives' to Speed Trial

By Connie Winkler

CW Staff

NEW YORK — The U.S. vs. IBM antitrust trial is speeding up at the same time it prepares to halt. That paradox has developed because both IBM and the Justice Department are trying a new technique of narrative statements, in the introduction of direct testimony from IBM's witnesses.

In order for the statements to be prepared, the court will go to a three-day, Tuesday-through-Thursday calendar for the next month.

IBM lead attorney Thomas D. Barr estimated the written narratives could save 150 to 250 trial days, but he asked for a 30 day hiatus to get the procedure organized. Judge David N. Edelstein rejected the hiatus but agreed to the three-day week.

Edelstein is optimistic about the narrative technique, which has been tried successfully with two witnesses, IBM controller C. Arthur Northrop and Dr. H. Dean Brown of Zilog, Inc., whose testimony has just been completed.

The judge also agreed to another experiment in which the narrative would be presented in lieu of the deposition, when witnesses are questioned about the nature of their testimony. The first witness with which this will be tried is Jane Cahill Pfeiffer, who was to be deposed in early December. Pfeiffer, a successful IBM executive and former IBM corporate director of communications, was recently named chairman of the board of RCA.

Lead government attorney Robert S. Staal objected vigorously that the depositions not be discontinued entirely. And he refused to give up the government's prerogative to subpoena documents after the introduction of the narrative statement.

In the robing room chambers where this was discussed, Staal also suggested that the narratives were just a tactic by Barr to delay the trial. Barr vigorously objected that it is important to his client to finish the case as soon as possible.

Barr was much more enthusiastic about the use of the narratives and characterized them as the first real opportunity to expedite procedures.

Whereas IBM direct testimony could have taken a week or longer, with controller Northrop it took less than five minutes. Northrop's direct testimony consisted of the introduction of 18 written pages and 11 exhibits. With Brown, who has extensive experience in the computer industry dating back to the Atomic Energy Commission, the direct testimony took 27 pages supplemented by a half-day of live testimony, which was requested by government counsel.

Barr's only problem with the narratives was that he did not have the staff to take them and write them while at the same time attending depositions, producing documents and carrying on the case in court.

However, despite the rhetoric about expediting matters, the fact remains that IBM has more than 50 witnesses yet to call, although that number has been reduced from about 150.

It took the government three years to present 54 witnesses. IBM, despite an August recess, has already called 10 witnesses.

Supershorts

Memorex Corp. has signed a license agreement with Enertec, Paris-based manufacturer of instrumentation magnetic recorders, giving Memorex the right to manufacture and market data cartridges worldwide using Enertec patents. The agreement also grants Memorex exclusive rights for one year to produce 1/4-in. cartridges.

— — —

Computer Devices, Inc. has set up a marketing operation in Paris to distribute its Miniterm line of portable and desktop terminals and computers in Europe and the UK.

— — —

Network Systems Corp. has signed Tesdata Systems Corp. as exclusive distributor and service organization in Europe and the Middle East for Network Systems' Hyperchannel computer interconnect networks.

— — —

IBM has declared a regular quarterly cash dividend of $2.88 per common share, payable Dec. 9 to holders of record Nov. 8.

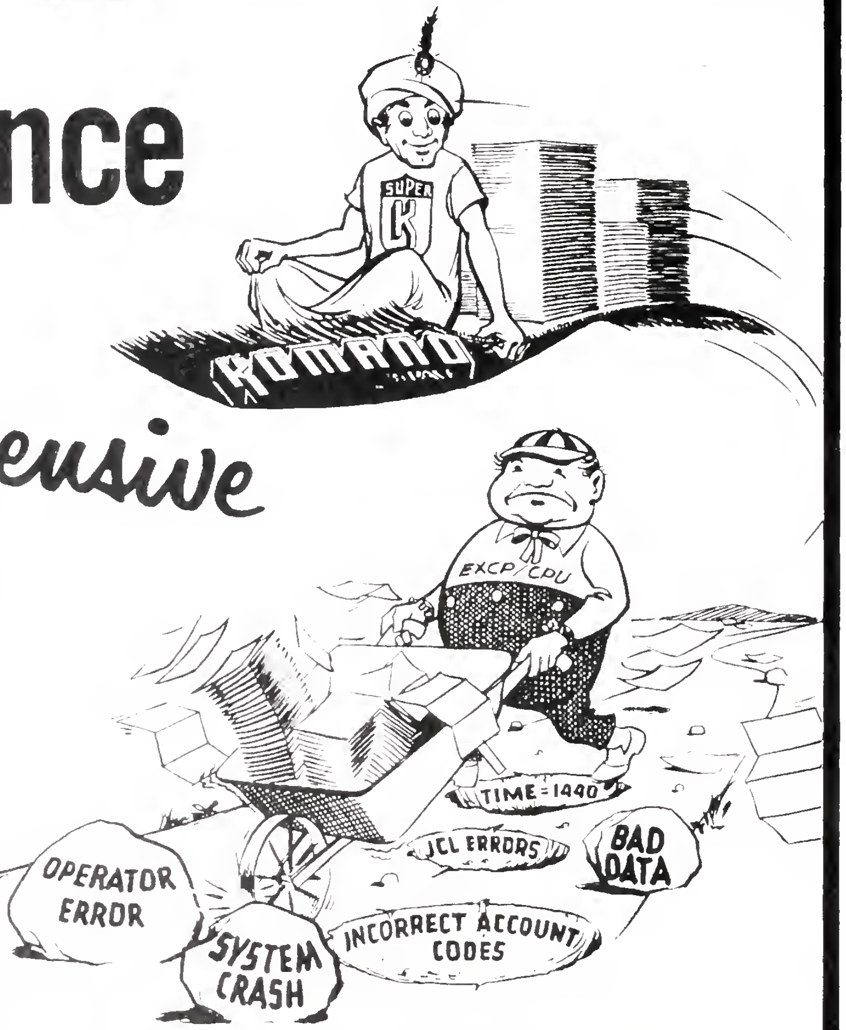
— — —

Computer Micrographics, Inc. plans to spend nearly $1 million for new equipment at its nationwide service centers, bringing the firm's total capital investment over the next two years to more than $2 million.

— — —

Indeserv, an association of independent service companies that provides contract field service for DP and communications equipment, has added service capability in Raleigh, N.C.; Billings, Mont.; and Portland, Maine.

Ignorance is ~~bliss~~ expensive



Resources ignored mean dollars uncontrolled.

A job accounting system based on EXCP counts and CPU usage omits direct accounting for most of your data processing dollars.

A job accounting system without protection against data loss from system crashes, operator errors, incorrect account codes, JCL errors, bad SMF data, time = 1440 is too porous to be trusted or credible.

KOMAND alone provides the data integrity and completeness you need. By installing KOMAND, you can have the power and economy of a system which tells the whole truth.

Send for a free job accounting evaluator

This generalized requirements checklist was developed from PACE's 8 years of experience with several thousand job accounting users. It will put your needs in focus.

KOMAND BY PACE

PACE Applied Technology, Inc. Telephone (703) 369-3200 TWX 710 833 0852
7900 Sudley Road, Manassas VA 22110

☐ send brochures
☐ send evaluator

Name ____ Title ____
Company ____ Phone ____
Address ____
City ____ State ____ Zip ____
Computer ____ Operating System ____

The PACE for Today...and Tomorrow

N208

UNDERSTANDING SOFTWARE

1 day seminar
Dec. 11, 1978

For the manager, the professional, the technician To direct your attention to old errors in new technologies Contact:

OCCIDENTAL DATA INC.
P O. Box 38
Occidental, Ca. 95465
(707) 874-2586

How do you make a flexible disc-based business computer with data base management, an inquiry language, forms and report writing software, up to 192K bytes of system memory and 64K bytes of user memory, built-in self-test features and a price of $24,500?

Simple.

Until now, the low-priced business computer was a pretty unsophisticated machine. That's because nobody had figured out how to make a powerful system work in a simple way. Not any longer.

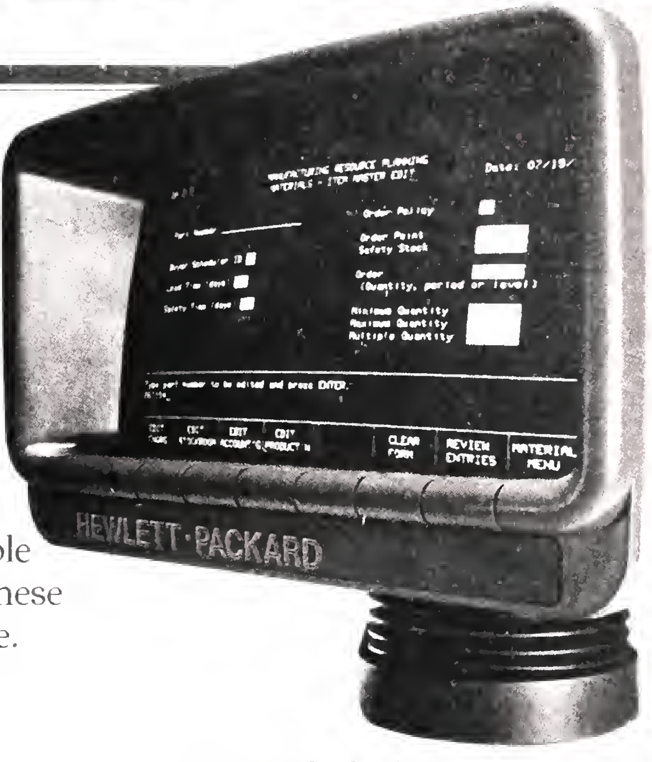
The HP250 is simplicity itself to operate.

The eight soft keys built into our movable CRT are extremely helpful. They're captioned on the screen, prompting the operator in using a program or the programmer in writing one. It's very fast because the operating system is memory-based. And we added data base management (previously only available on much larger, more expensive systems) to handle complex business information problems. So you get all the benefits of a fast, sophisticated system without having to hire a computer expert to run it.

Our stylish computer is simple to program.

37802HPFC36

The HP250.



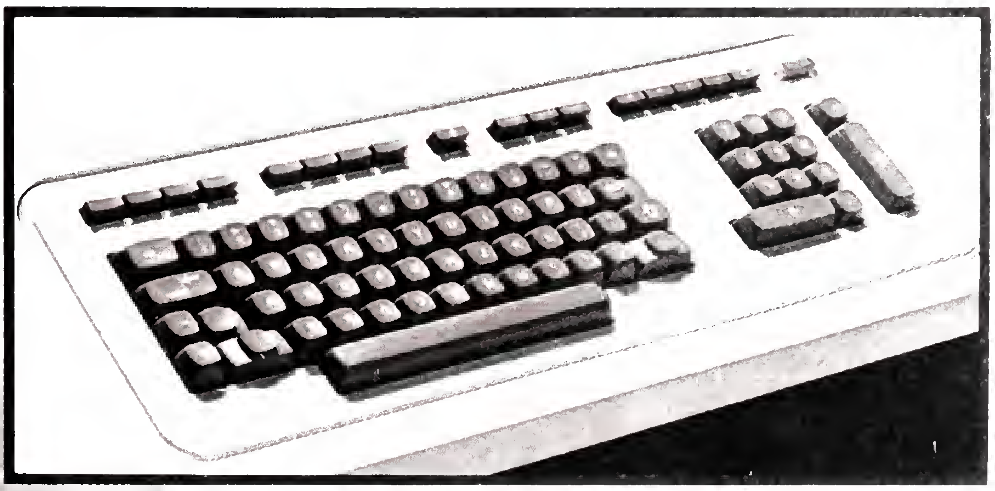
With HP Business BASIC, IMAGE/250 (the DBM software), QUERY/250, FORMS/250, and REPORT WRITER/250, you have a set of versatile tools to get the most out of the system in the least time.

Tucked inside the desk is our high-speed processor and main memory. All the boards fit on to a chassis that rolls out for easy maintenance or expansion.

Under a sliding cover, you'll find our flexible disc drives. You can expand from one to three of these or add hard disc memory to extend your storage.

Designed to fit beautifully into your office decor.

Slim as a modern desk, the HP 250 was designed to fit beautifully into your office decor, and make life simple for the operator. The keyboard is laid out like a typewriter and the 10-key numeric pad like a standard adding machine. And, rather than the operator having to adjust to the CRT, it moves horizontally and vertically to provide the best viewing angle.



The HP 250 offers a choice of printers for hard copy output, and an optional sound reduction module makes the high-speed printer quieter than an office typewriter.

A powerful computer that takes care of itself.

The HP 250 also has self-test features which operate automatically as soon as you turn it on and let you know right away whether all systems are go. If they're not, it will help track down the source of the problem.

Considering the power and simplicity of the HP 250, you'll be pleasantly surprised by the price. You can get a complete system for as little as $24,500. For a closer look, call the HP office listed in the White Pages. Or write to Hewlett-Packard, Attn: Alex Sozonoff, Dept. 333, 3400 E. Harmony Road, Fort Collins, Colorado 80525.

HEWLETT hp PACKARD

Prices are U.S. list.

Japan's General-Use CPUs Seen Tripling by '85

TOKYO — At the end of 1976, there were 38,927 general-purpose computers installed in Japan according to statistics compiled by the Ministry of International Trade and Industry (Miti) here.

And Miti estimated by 1985 the number of installations will increase nearly threefold, climbing to 107,000 units, representing about a 12% annual growth rate in the use of general purpose computers in Japan.

In addition to these general-purpose systems Miti reported 11,094 minicomputers in use, and the Japan Electronic Industry Development Association noted that 8,000 process control computers were in service.

Yoshio Honda, general manager of Fujitsu Ltd.'s California office, estimated the installed base in Japan at the end of 1976 to be worth about $12.5 billion.

According to breakdowns supplied by Miti (see chart), foreign-made computers account for about 36% of the installed base, with the dollar value of foreign-made units amounting to 43.2% of the total worth of general-purpose computers.

From 1975 to 1976, the monetary value of general-purpose systems installed grew by 15.5%. But Miti noted that the value of Japanese-made units grew by 18.3% while the value of foreign-made units grew by only 10.6%.

Miti's figures show that foreign-made units are utilized more frequently in the large-scale and very small-scale categories.

Five industries accounted for 63% of general-purpose computer usage. Following are the unit breakdowns for the five largest industry users: the wholesale, agency, brokerage and retail sectors accounted for 12,736 units; the financial sector, 4,371 units; the service sector, 2,851 units; cooperative and other associations, 2,149 units; and the electrical machinery sector, 1,925 units.

The financial industry is the top spender for general-purpose computer equipment, Miti reported, with total installations valued at about $2.4 billion. The wholesale, brokerage, agency and retail industries follow with total equipment valued at about $1.4 billion.

Aside from the compounded annual growth of about 12% forecast for general-purpose computers, Miti predicted that on-line terminal equipment growth will top 23% annually until 1985.

Although compiled annually, the 1976 statistics are the latest figures available from Miti.

GENERAL-PURPOSE COMPUTER SYSTEMS
IN USE IN JAPAN
AS OF DECEMBER 31, 1976

(Figures Supplied by Miti)

Unit Size	Domestic Products	Foreign Products	Total	Percent Of Grand Total
Large	755	391	2,179	5.6%
$830,000-$1.67 Million				
$1.67 Million and Up	492	541		
Medium				
$130,000-$330,000	2,894	865	6,082	15.6%
$330,000-$830,000	1,723	600		
Small				
$33,000-$130,000	8,235	2,788	11,023	28.3%
Very Small				
Up to $33,000	10,985	8,658	19,643	50.5%
Grand Totals	25,084	13,843	38,927	100%

168 Wanted to buy!

Call Michael O'Connell at
COMDISCO (312) 698-3000
or your nearest COMDISCO office.

COMDISCO®

PCC Planning to Acquire Part of Philip's Assets

LOS ANGELES — Pertec Computer Corp. (PCC) and North American Philips Corp. have signed a letter of intent whereby PCC would acquire certain assets of Philips' small business computer operations in the U.S.

Part of the letter of intent stipulates that PCC would provide service and software support in the U.S. for the small business computers sold by the Data Systems Division of Philips Business Systems, Inc.

Under the proposed seven-year agreement, Philips would transfer to PCC the maintenance obligations for the installed base of systems sold by the Data Systems Division as well as associated software and spare parts for maintenance purposes.

Furthermore, PCC would obtain nonexclusive rights to all existing and future software developments for these systems.

Although neither company would comment on the agreement or specify which particular assets of Philips are involved, a definitive agreement is expected by mid-December.

Contracts

The following contracts have been awarded to Canada Systems Group: The financial Management Branch of the Ontario Ministry of education has signed a 12-month agreement valued at approximately $10,000. The Regional Municipality of Ottawa-Carleton has signed a one-year contract that will cover about $10,000 worth of processing; and Douglas Aircraft Co. of Canada Ltd. has signed a 12-month agreement for approximately $10,000 using Canada Systems' Computer Output Microfilm services.

Anacomp, Inc. has signed a contract with the National Bank of Kuwait to modify and install its Customer Integrated Reference File for the bank and its 35 branches.

Integrated Software Systems Corp. has been awarded a contract from the National Research Council, Ottawa, Ontario, Canada. Under the terms of the contract, the council has licensed Integrated Software's Disspla computer graphics software system.

Tally Corp. has an OEM agreement with Four-Phase Systems, Inc. for the purchase of its Tally printers over a three-year period.

Pertec Computer Corp. has been awarded a $1.3 million two-year contract by General Computer Systems for tape and disk drives.

TERMINALS FROM TRANSNET

PURCHASE
12-24 MONTH FULL OWNERSHIP PLAN
36 MONTH LEASE PLAN

DESCRIPTION	PURCHASE PRICE	PER MONTH 12 MOS	24 MOS	36 MOS
DECwriter II	$1,495	$145	$ 75	$ 52
DECwriter III, KSR	2,195	210	112	77
DECwriter III, RO	1,995	190	102	70
DECprinter I	1,795	172	92	63
VT100 CRT DECscope	1,595	153	81	56
TI 745 Portable	1,875	175	94	65
TI 765 Bubble Mem.	2,995	285	152	99
TI 810 RO Printer	1,895	181	97	66
TI 820 KSR Terminal	2,395	229	122	84
QUME, Ltr. Qual. KSR	3,195	306	163	112
QUME, Ltr. Qual. RO	2,795	268	143	98
ADM 3A CRT	875	84	45	30
HAZELTINE 1400 CRT	845	81	43	30
HAZELTINE 1500 CRT	1,195	115	67	42
HAZELTINE 1520 CRT	1,595	153	81	56
DataProducts 2230	7,900	725	395	275
DATAMATE Mini floppy	1,750	167	89	61

FULL OWNERSHIP AFTER 12 OR 24 MONTHS
10% PURCHASE OPTION AFTER 36 MONTHS

ACCESSORIES AND PERIPHERAL EQUIPMENT
ACOUSTIC COUPLERS • MODEMS • THERMAL PAPER
RIBBONS • INTERFACE MODULES • FLOPPY DISK UNITS

PROMPT DELIVERY • EFFICIENT SERVICE

TRANSNET CORPORATION
2005 ROUTE 22, UNION, N J 07083
201-688-7800

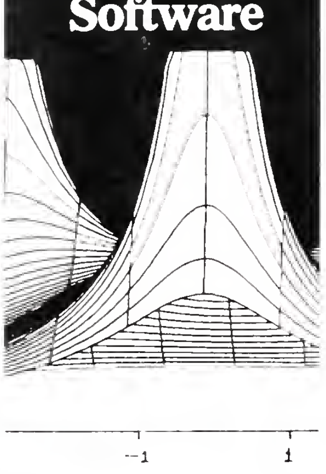
TERMINALS FROM TRANSNET

Are you contemplating a purchase of a small business computer system? Before you do, get some solid guidance.

A new report-SELECTING AND DEVELOPING YOUR SMALL BUSINESS SYSTEM - is now available from NEW DIVISION PUBLICATIONS, #29 Meadowbrook Apartments, Ellington, Ct 06029.

Prepaid only. It could be the best $10 you ever spent.

DISSPLA®
Machine and Device Independent Graphics Software



For Information Call Or Write:
ISSCO®
Integrated Software Systems Corporation
4186 Sorrento Valley Blvd., Suite G,
San Diego, CA 92121 (714) 452-0170

Harris delivers mainframe APL performance for under $125,000.

Here is the Harris System that outperforms larger computers doing APL work. At a price less than $125,000.

It supports 4 concurrent APL users. Is expandable to 8. And can be upgraded to as many as 32 users.

Harris APL is full function. Complete with shared variables and virtual workspace features. And all the standard primitive functions and operators, including domino, format and scan.

It is the Harris S123 system with 240,000 bytes of Real Memory — 1,536,000 bytes of Virtual Memory — Floating Point Hardware — a 40-Megabyte Disc Drive — a 9-track Magnetic Tape Unit — a DMA Communications Processor with 4 Asynchronous Ports — and a System CRT with Keyboard and Controller.

The system price includes the APL Processor, VULCAN Operating System (Virtual Memory), FORTRAN, COBOL, 4 other language processors, and utility programs.

The Harris System fits the needs of APL users. In productivity. In versatility.

If you're spending more than $3,800 monthly for an APL time-sharing service, the Harris APL system is a lower cost alternative.

Or, if you're planning to upgrade your present mainframe computer because of growing APL usage, the Harris APL system is a practical enhancement.

For mainframe APL performance.

At less than $125,000.

A wise investment.

Let us prove it to you. Fill out and send the coupon below, or call us at 1 (305) 974-1700, extension 1369.

Harris Computer Systems
Marketing Communications
2101 Cypress Creek Road, Fort Lauderdale, Florida 33309

☐ Please send complete details
☐ Please contact me immediately.

Name________________
Title________________
Company________________
Address________________
City________ State________ Zip________
Telephone________________

In Europe: Harris Systems, Ltd., 145 Farnham Road, Slough, SL1 4 XD, England.

HARRIS
COMMUNICATIONS AND INFORMATION HANDLING

CDC Fifth DP Firm With Moscow Office

WASHINGTON, D.C. — Control Data Corp. recently became the fifth computer company to officially establish an office in Moscow. The primary purpose for opening a Moscow office is to [illegible] and acquire Soviet technology, according to a CDC spokesman here.

CDC received the required accreditation from the USSR State Committee for Science and Technology on Oct. 31. The accreditation process took about two years. CDC is the 24th U.S. company to be granted accreditation.

The Soviet operation is headed by James Totman, a former official at the U.S. Embassy in Moscow.

Recursive processing is one Soviet technology CDC is exploring in great detail, according to Robert Schmidt, executive vice-president of CDC.

These systems are used primarily for process control; they consist of a series of computers hooked together in a random fashion. This allows any portion of the equipment to work on a program without particular ordering sequence, he explained.

An official statement released by the Soviet Embassy here noted that the foundation was laid for cooperation between CDC and the USSR five years ago. At that time, CDC and the USSR Committee for Science and Technology signed a long-term agreement which included setting up a joint coordinating group to study specific computer designs.

Prof. Vladimir Myasnikov, a member of the USSR Committee for Science and Technology, said U.S. companies are interested in the vast potential of the Soviet marketplace as well as Soviet technology.

CDC purchases equipment from the USSR. According to Myasnikov, "the company purchased a computer system based on the GDR-made EC-10-40 with Soviet peripherals and is now negotiating the purchase of applied program packages."

IBM, Hewlett-Packard Co., Honeywell, Inc. and Sperry Rand Corp. are the other computer companies with offices in Moscow.

CDC Gets Approval to Sell Technotec Service to USSR

(Continued from Page 73)

Schmidt explained.

The data base does not contain the technology itself, but rather lists brief abstracts of what the technology can do, Schmidt said, so interested persons can contact the seller to complete a final transaction.

"By making our Technotec data base more readily available to the Soviets, we expect to contribute to a favorable balance of trade through the sale of commercial technology," he said.

In return, CDC hopes to gain more Soviet technology briefs to "offer U.S. industry the opportunity to evaluate new and improved processes in many areas." Technotec already contains some 200 Soviet entries, he noted.

Calling the service "a huge international set of yellow pages," Bill Moody, recently named Technotec president, said CDC maintains the technology abstract listing on its worldwide Cybernet data service.

CDC started Technotec about three years ago. While each partner in any technology exchange is free to pursue the market in its own way, the industry first expressed some concern over competitive disadvantages that could result from duplicating products.

Asked how receptive industry has been to the service in light of this concern, Moody pointed out that the Technotec data base has grown to include more than 18,000 entries and called the market potential "tremendous."

"Technology transfer is actively pursued in almost every type of organization through R&D groups, corporate development functions and patent license departments," he said.

Free Listings

To spur technology exchanges in the "critical" areas of solar energy, agriculture and food processing, CDC plans to offer 1,000 free one-year listings to individual inventors who hold patents in these areas. Through this offer, the firm hopes to add about 700 U.S. and 300 international patents to the Technotec Inventor's Registry.

Because searchers who find useful technologies in the Technotec data base usually contact the owner directly, CDC finds it difficult to track specific companies which, through its service, have made exchanges.

"While we know matches have occurred between a potential buyer and seller," Moody added, "the business relationships that may result are and should be private."

He did, however, cite two general examples of technology exchanges made via Technotec. One involved a U.S. mechanical refrigeration firm that supplied a special immersion freezing technique to a Venezuelan fishing fleet company.

Another deal is in the works between Soviet and West German firms for information on integrated circuit manufacturing techniques.

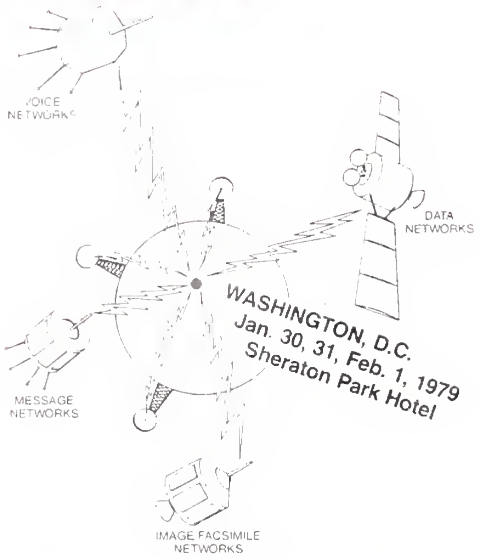
Get Ready Now for Leadership in the New World of Communication Networks!

Why you should attend Communication Networks 79 Conference and Exposition

- The executive who knows how to tie all the elements of his organization together via a communications network is the *leader* of tomorrow!
- Learn how to plan for new Packet Networks, including AT&T's ACS!
- See how effective planning will enable you to take advantage of new network architecture!
- See how Electronic Mail and the Office of The Future will impact the way business is done today!
- 3 full days, 40 sessions, 150 speakers. You get *more* at Communication Networks 79!

Why your company should exhibit

- The Decision-makers will be here because of the most comprehensive program ever presented!
- The Policy-makers will be here to help frame the new regulatory policies vital to the future of communications!



WASHINGTON, D.C.
Jan. 30, 31, Feb. 1, 1979
Sheraton Park Hotel

COMMUNICATION NETWORKS '79

CONFERENCE & EXPOSITION January 30–31, February 1, 1979

CASH IN ON THIS $40 BILLION DOLLAR MARKET.

I'm interested in Communication Networks 79. Please send me:

☐ A reservation for exhibit space ☐ Registration details

The Conference Company
60 Austin Street
Newton, Massachusetts 02160
(617) 964-4550

name title
company
address
city state zip
phone

CW1127

Lessor Asks: Will Terminal Leasing Firms Last?

BOSTON — "Terminal leasing businesses are springing up almost overnight in every part of the country. The question, though, is whether these companies will be in business two years from now."

Sonny Monosson, president of American Used Computer Corp., asked that question in a recent interview and also noted that terminal leasing is growing even faster than computer terminal sales, which are expected to double by 1982.

Terminal lessors are today experiencing pressure from two fronts, according to Monosson. On one side, users are clamoring for short-term leases — ideally 90-day leases. On the other side, however, commercial lending institutions are reluctant to lend money to lessors for purchases of terminals unless they obtain one-year leases from their customers.

"With money so tight right now, there is a problem, and probably not many firms will be able to offer short-term leases," Monosson reasoned. Consequently, customers will be putting pressure on manufacturers to offer short-term leasing programs.

A major force behind the demand for terminals has been the rapid development of distributed processing and telecommunications systems within the last five years, he said.

Competition Among Vendors

Terminals are being announced at the rate of almost one per week by both major manufacturers and relative unknowns, Monosson noted. These manufacturers, however, favor large-volume sales to OEMs and distributors to avoid the financial headaches of customer support.

This competition among vendors has flooded the marketplace with "special-purpose terminals which are technological masterpieces but often exceed user requirements and are very costly. Misinformation about terminals and a preference for leasing has resulted when vendors try to unload these terminals on a large scale, he said.

Leases give a user the chance to evaluate terminals on location and to determine the company's actual needs without having to make a commitment. Users are also reluctant to buy because they wish to avoid tying up cash flow on capital assets and are not able to define specific time and need requirements.

Flexibility is what the customer needs and wants, Monosson stressed. Everyone has the same hardware and can offer rock-bottom rates.The thing that's going to separate the surviors from the nonsurvivors is the ability to offer lease flexibility and customer support."

The problem for many of the smaller lessors and newcomers is that they are not in the position to offer flexible terms. Commercial lending institutions, with a typically cautious approach, are dictating the policies by which these businesses lease hardware, Monosson pointed out. Limiting lease periods to a minimum of one year, requiring user committal to lease purchase plans and setting extensive roll-over penalties were some of the policies Monosson cited.

These policies considerably jeopardize marketing capabilities. What is worse, Monosson emphasized, is that when all local or regional competition is bound to these restrictions, the user is placed in the unfavorable position of having to accept lease terms that are contrary to his needs.

Regional distributors have usually held the edge within their own territories because customers prefer to avoid high shipping costs on top of installation fees. But when high shipping costs are weighed against inflexible lease structuring by local competition, concerns about shipping costs disappear, he pointed out.

Companies capable of offering short-term leases, monthly roll-over periods and purchase options will become increasingly effective in penetrating regional and local markets, Monosson predicted. American Terminal Leasing Co., for instance, has been highly successful in nationwide leasing of Decwriter IIs and IIIs because of its month-to-month leases.

Customer support is the other key area where businesses must outperform their competition, Monosson maintained. This is basically a function of experience. When you've been in business for a long time, you've had the chance to make a lot of mistakes.

Steps for Success

Having the hardware on hand is the first step. Smaller businesses and newcomers may initially have the terminals, Monosson noted, "but what happens when they've just leased their whole inventory for a year and they get a call for five CRTs tomorrow?"

A positive aspect of the short-term lease is the constant inventory turnaround and availability.

Equally important is the physical space to stock inventory.

Providing quick delivery and pickup is the second step. "A terminal lessor must develop a fine-tuned rapport with the trucking industry," Monosson said.

Making sure the terminal is properly installed and running is the final step. Constant telephone contact with the field service organization — usually provided by the manufacturer — is necessary. "A thorough knowledge of terminals and hands-on experience is absolutely necessary for the terminal lessor," Monosson noted.

Survival Pressure

"It is important to treat the customer with courtesy. There's a lot more to it than just signing the contract. When it comes to customer support your first impression is a lasting one ... you'd better make sure it's a good one," Monosson emphasized.

The pressure to survive is already being felt in the terminal leasing industry. According to Monosson, those with inadequate remarketing ability and limited capital will probably go the way of the IBM 360 lessors — very few of the original leasing firms have survived.

In time, all survivors in the terminal leasing industry will offer basically the same terminals, rates and lease flexibility, he believes. Then banks will be more likely to loosen the harness on lease policy with the surviving lessors, so that the only difference between them will be in customer service.

Monosson left potential terminal users to ponder two possible threats to the industry: "There are two major questions that may confuse the entire market. Will the Japanese invade the market, as they have the television market and more important, will every telephone eventually become a terminal?" These two real threats to a stable market should encourage the short-term lease.

NOVA & ECLIPSE
DEPOT MAINTENANCE

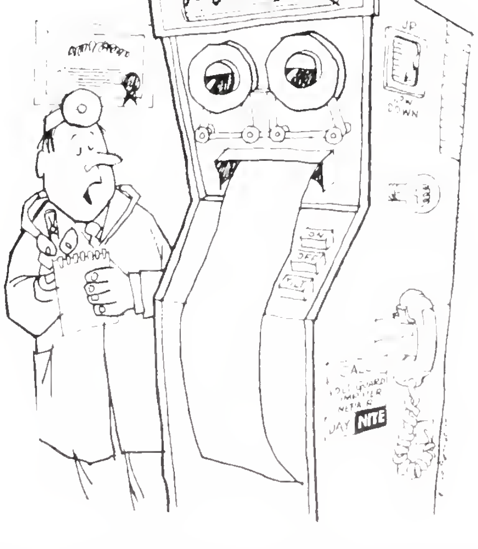
72 Hour normal turn around. Fixed rates on all Nova & Eclipse boards. Plug in compatibles also serviced. Field services also available for pure or mixed Data General systems. Areas serviced include: Pittsburgh-Philadelphia-Morgantown-Cleveland-Washington D.C.-Baltimore-Norfolk-Richmond and surrounding areas.

For the Best Service Call:

COMPUTER SYSTEMS SUPPORT CORPORATION
9112 Gaither Road
Gaithersburg, Maryland 20760

DEPOT SERVICE
(301) 948-6550

FIELD SERVICE
(301) 424-7870



"Install one VOLT-GUARD and see me in the morning."

VOLT-GUARD provides electrical surge and transient protection — 50 nano seconds fast! Its excellent line filtering capability insures absolute stability over a wide range of applications, from mini to mainframe. This solid-state device installed in parallel on the A-C power lines to your CPU and data access terminals, will have beneficial effects such as reducing circuitry heat, thus improving the operating efficiency and increasing the on-line serviceability of your system. Remember: Increased efficiency equals savings! The very best in quality line surge protection for your equipment. Less than $500.00
DON'T WAIT! Write or call for complete information, and the name of your local supplier

SOUTHERN
CONSOLIDATED
CORPORATION
5400 - 9th Street North
St. Petersburg, FL 33703

In Florida call: 813/526-8527 Out of state dial toll free
1-800-237-0769
DEALER INQUIRIES INVITED

TEXAS INSTRUMENTS
PORTABLES IN STOCK

LEASE [illegible]
$79.80 MO.
1 YEAR LEASE
[illegible]

ALSO AVAILABLE FROM STOCK
ADDS CRTS
CENTRONICS PRINTERS
DIABLO PRINTERS
DATA GENERAL PRINTERS
HAZELTINE CRT
PERKIN-ELMER PRINTERS
TI 733 [illegible]
MODEMS, COUPLERS & MONITORS

Westwood Associates, inc.
DATA COMMUNICATIONS EQUIPMENT
1442 Broad Street, Bloomfield, N.J. [illegible]
(201) 338-0200 (212) 961-3015
Philadelphia Area [illegible]
Pittsburgh Area [illegible]

Judge Allows CFI Lawsuit Against Decimus

(Continued from Page 73)

mus employees in New York and San Francisco had received bribes and kickbacks.

CFI immediately countered, the suit explained, stating that the allegations of bribery were false. In October 1977, under oath, in written affadavits drafted by Decimus, CFI agreed to supply certain information to Decimus. Decimus, in turn, agreed to resume the contractual payments to CFI. However, Decimus reneged on its agreement to resume the payments, the suit alleged.

In its suit, CFI claimed it "has been damaged by Decimus' continued public and disparaging assertions of the false claim that improper payments may have been made by CFI."

CFI contended that Margoes intended to compel CFI to accept drastically reduced payments. Furthermore, it also accused Margoes of expressing the view that banks (meaning Decimus, a subsidiary of Bank of America) should make a lot of money and that CFI should not make so much money. This viewpoint, CFI said, was one of the factors causing Margoes to start the bribery investigation against CFI.

Dismissal Asked

Rather than respond to any of the charges, Decimus filed a motion in June to dismiss several of CFI's charges. A motion to dismiss the charges against Margoes and Mickel was made on the grounds that the court lacked personal jurisdiction over those defendants in their individual capacities, particularly since they did not reside in New York during the time the alleged activities took place, but rather traveled to New York infrequently and for short durations.

The defendants asked the court to dismiss other complaints on the grounds that in New York a breach of contract does not constitute an actionable tort and that punitive and exemplary damages are not recoverable on a claim for breach of contract.

The ruling made by Judge Richard Owen, however, indicated that those claims made by CFI against Decimus can indeed be heard in New York courts.

Law to Spur Risk Capital

(Continued from Page 73)

more than $30,000 in assets to pay for one additional job in a high-technology firm, and $14,000 of that capital must be obtained through risk capital.

Although the value of stocks of high-technology companies can quadruple in three or four years, the high risk involved with those investments compounded with a maximum capital gains tax rate of 49% caused many investors to avoid those stocks, Kenneth Hagerty, vice-president of government operations for the AEA, pointed out.

Pressure from the AEA task force and grass roots support from executives in AEA's 1,200 member firms, along with backing from Rep. William A. Steiger (R-Wis.) and Sen. Clifford P. Hanson (R-Wyo.), were the forces that overcame President Carter's threat to veto any tax bill containing provisions for cuts in the maximum capital gains tax, according to AEA officials.

our international publications reach a two billion dollar international market for U.S. computer products and services

And you can advertise in all of them through us.

As the chart below shows, the nine countries served by our international publications include 70% of all the general purpose computer systems outside the United States, measured by value.

They include seven of the largest computer using countries in the world, and two of the fastest-growing. And they all rely heavily on U.S.-made computer products. Imports are currently running at more than two billion dollars, and growing rapidly. Mainframe shipments are growing at 8% a year, with even higher growth rates for products such as small systems (20%) and minicomputers (36%). And the total CPU installed base in these nine countries is expected to top 46 billion dollars by 1981!

Obviously, these are excellent marketplaces for American manufacturers, and you can reach key buying influences in one of them, some of them, or all of them through us. As publishers of **Shukan Computer, Computerwoche, Computer Management, Australasian Computerworld,** and **DataNews;** and sole U.S. representatives of the French, Italian, Canadian, and Middle Eastern publications—we can give you one-stop advertising in these nine marketplaces—including translation and production services. We'll also bill you in dollars—so it's as easy as advertising in U.S. publications.

We'll be glad to send you a free marketbrief with more facts on the international marketplace, as well as information on each publication. Just send in the coupon, or give Roy Einreinhofer a call at (617) 965-5800.

Country	Installed Value of General Purpose Computer Systems	% of total world value	World Rank as DP Market
United States	36,100	45.3%	1
Japan	8,331	10.0	2
W. Germany	6,527	7.9	3
United Kingdom	4,794	5.8	4
France	4,768	5.8	5
Canada	2,301	2.8	7
Italy	2,119	2.6	8
Australasia	2,044	2.5	9
Brazil	532	.8	17
Middle East	328	4	22

CW COMMUNICATIONS/INC.
Publishers of Computerworld, Computer Business News and other leading computer publications around the world.

TO: **Roy J. Einreinhofer,** Vice President, Marketing
COMPUTERWORLD, 797 Washington Street
Newton MA 02160 (617) 965-5800

I'd like a free copy of your marketbrief, "The International Marketplace for Computer Products and Services" as well as information on your publications in the countries I have checked.

United Kingdom
United States
Middle East
Germany
Australasia
Canada
France
Brazil
Italy
Japan

Name
Title
Company
Address

Executive Corner

- Harry J. Morley has been elected president of ITT Communications Systems, a division of International Telephone & Telegraph Corp.
- J. Robert Harcharik has been named president of Tymnet, Inc.
- Sherman A. Drusin has been named president of Program Products, Inc. Paul R. Kalback has been promoted to senior vice-president and Emanuel A.Cambra has been promoted to vice-president at the firm.
- Peter S. Jonas has been elected vice-president of finance, treasurer and chief financial officer of General Automation, Inc.
- Charles A. Dickinson has been appointed senior vice-president of operations at Data Products Corp.
- James Graves has been appointed to the position of vice-president of operations at Micom Systems, Inc.
- Paul R. Lachance has been appointed national sales manager for Data I/O Corp.
- Joseph C. Antonaccio has been named director of communications for Analogic Corp., and Ronald F. Morales has been appointed purchasing manager at the firm.
- J.W.E. Hollely has been named product marketing manager for the System Ten product line at ICL, Inc.
- C. Jean Littrell has been promoted to corporate marketing services manager at Stanford Applied Engineering, Inc.
- Charles Cech has been appointed vice-president of sales at Pro-Log Corp.
- Ben Irwin has been promoted to manager of programs at Monolithic Memories, Inc.
- John DeLuca has been appointed director of operations control for the Wyle Distribution Group.

Wherever it's said, however it's spelled, Informatics® fulfills the promise of the computer...universally!

Informatics...throughout the world, the word is synonymous with the ultimate in modern data processing. In the United States and many other countries, it means the people, products and services of Informatics Inc. Many people know us for our software products, such as MARK IV®, or our information processing services. But we also provide a full range of professional services. Over 2,000 trained specialists available for information systems design, systems development, applications programming, management consulting, technical and managerial training, or full-scale facilities management. Informatics Inc., one of the world's leading independent suppliers of software products and services. Drop us a line on your letterhead and we'll send you a colorful brochure that tells how we can help you fulfill the promise of *your* computer.

SOFTWARE PRODUCTS
PROFESSIONAL SERVICES
INFORMATION PROCESSING SERVICES

informatics inc

Corporate Offices/21031 Ventura Boulevard/Woodland Hills, California 91364/(213) 887-9040/Telex 69-8473

Member SIA Software Industry Association ®U.S. registered service marks and trademarks of Informatics Inc.

NOW THERE'S A MICRONOVA COMPUTER SYSTEM FOR EVERY DiFAZIO BROTHER.

There were five DiFazio brothers who all happened to be OEMs. One of the few things they agreed on completely was Data General microNOVA™ systems. Each brother had no trouble choosing the perfect system for his particular needs. Brother Bob was putting together a medical patient billing system; Mario, a point-of-sale system; Joe, a warehouse inventory control system; Tony, a laboratory instrumentation system; and John, a factory data acquisition and control system.

All of the DiFazio brothers found that their system design was made a lot easier because Data General also offers the

industry's widest range of microcomputer system software and peripherals . . . such as disc and diskette operating systems, single and multiuser Extended Basic, Business Basic, Fortran IV, and Communications (2780, 3780, Hasp II) and sensor I/O software packages. The wide range of peripherals include dual diskette and 10Mb cartridge disc systems, 180 cps DASHER LP2™ printers and DASHER™ terminal printers and displays.

Now their present needs are taken care of and the DiFazios are looking forward to the future. Anytime they want to expand their systems, they know they can keep it all in the microNOVA family. If you'd like to get better acquainted with our family, just send the coupon for the new microNOVA systems brochure, "The microNOVA Cookbook – A Taste of Success" or call 617-366-8911, ext. 4735.

CW1127

☐ I'd like to have your new microNOVA brochure.

☐ I just can't wait any longer. Have someone get in touch today.

NAME

TITLE

COMPANY

TEL. NO.

ADDRESS

CITY

STATE

Data General Corporation, Westboro, MA 01581, (617) 366-8911. Data General (Canada) Ltd., 411 Horner Ave., Ontario. Data General Europe, [illegible] Paris, France, 766 51 78. Data General Australia, [illegible] Data General [illegible] Sao Paulo, Brazil 543-0138. Data General Middle East, Athens, Greece, [illegible]
© Data General Corporation, 1978. microNOVA, DASHER LP2 and DASHER are trademarks of Data General Corporation.

Data General

We make computers that make sense.

POSITION ANNOUNCEMENTS

PROGRAMMER/ANALYSTS

CSC

BRANCH OUT

TO
EXPAND
YOUR
CAREER
OPPORTUNITIES

Get the information you need by calling the CSC **Toll Free CAREER LINE...**

DIAL
1-800-638-0842

Call this number and ask for our Staffing Department. You'll receive information on the company that is working in support of such projects as Mission Support, Science and Applications, and Goddard Real-Time Systems at the NASA Goddard Space Flight Center.

And we'll also tell you about our Maryland suburban location just outside of Washington, D.C.

If you have a Bachelor's or advanced degree in Computer Science, Mathematics, Physics, Astronomy or Engineering; a background in large-scale or minicomputers; and a genuine desire to advance in your career: you owe it to yourself to call today.

COMPUTER SCIENCES CORPORATION

Staffing Department C-103
System Sciences Division
8728 Colesville Road
Silver Spring, MD 20910

Major Offices And Facilities Throughout The World
An Equal Opportunity Employer

ACADEMIC COMPUTER SERVICES

Applications are invited for the position of **COORDINATOR OF ACADEMIC COMPUTER SERVICES** at The American University in Washington, D.C. The Coordinator reports to the Director of Computer Services in a department with combined responsibility for research and instructional services, administrative systems development and computer operations. As leader and manager of the academic support group, the Coordinator is responsible for policy leadership and long range planning initiatives for academic services. The Coordinator will create and maintain liaison with faculty users and will promote both traditional and innovative computer usage for research and instructional programs.

The academic support group consists of the Coordinator, three professionals and two graduate assistants. Under the Coordinator's direction, this group installs and maintains software of general utility to the faculty and students, provides documentation and conducts training seminars for faculty and students. Faculty activity planning and diagnostic consultations are also provided

Computer users are serviced by an IBM 370/148 processor with VM/370, OS and MUSIC. There are about sixteen timesharing terminals in laboratories within the computer center and about twenty elsewhere throughout the University campus. CMS is provided for staff software development.

Candidates for this position must have at least five years of increasingly responsible professional experience, two of which required performance as a planner and manager, and two of which, preferably, have been in an academic environment. A working knowledge of OS-JCL, FORTRAN programming, experience in securing grants, and an advanced degree in a related field are all desirable attributes

Opportunity exists for persons with appropriate qualifications to teach parttime or to obtain a dual appointment with fulltime faculty status.

Salary will be commensurate with experience and responsibilities. Benefits include tuition remission for self and spouse, insurance and retirement programs and one month annual leave.

Submit letter of introduction and resume to **Mr. Robert Ogilvie, Director of Computer Services, Eagle Station Box 281, The American University, Washington, D.C. 20016.**

American University is an affirmative action/equal employment opportunity employer.

DALLAS

WE ARE PEOPLE MANAGERS

The theatrical and sports world people are successfully represented by managers throughout their career. We advocate the same procedure for the data processing industry and its people We pride ourselves in working on an individual basis and not in volumes. We have been extremely successful with this procedure for a number of years and would like to represent you if you have a strong desire for a data processing career. Remember your future is our future.

Contact: Richard Kemmerly or Tom Rung

Suite 1109 Stemmons Tower W
Dallas TX 75207 (214) 637-6360

DATA PROCESSING CAREERS inc

Megapulse, Inc. is the foremost developer of LORAN-C radio navigation equipment and vessel traffic management systems.

REAL TIME PROGRAMMER

1-3 years of experience in programming in FORTRAN. Must be familiar with PDP-11. Assembly language programming experience would be a plus.

Please forward your resume and salary requirements to Sue Higgins at

MEGAPULSE, INC
8 Preston Court
Bedford, MA 01730
275-2010

Megapulse

an equal opportunity employer m/f

Why limit your career horizons? The whole market, coast-to-coast, is open to you through

Dunhill

The National Personnel Agency Network for DP Professionals...dedicated solely to filling jobs and finding people...in salary ranges from $13K all the way up...in all 50 states!

PROGRAMMING SPECIALISTS
- PROGRAMMER ANALYSTS (COBOL, BAL, PL-1, RPG, ASSEMBLY)
- SYSTEMS ANALYSTS INCLUDING MARKETING SUPPORT
- TELECOMMUNICATIONS
- ENGINEERING AND SCIENTIFIC
- PERFORMANCE/MEASUREMENT/EVALUATION
- DATA BASE DESIGNERS & ANALYSTS
- EDP AUDITORS
- MICROPROCESSOR—DESIGN/APPLICATIONS
- MINI APPLICATIONS

MARKETING & SALES SPECIALISTS

Regardless of *your geographic preference*, simply contact the Dunhill agency nearest you listed on this page. Naturally, all inquiries are held in strictest confidence. We'll take it from there! No cost or obligation, of course.

Demand Dunhill wherever you are. **Dunhill** A National Personnel Service

Alabama
Dunhill
#2 Metroplex Drive—Ste. 100
Birmingham, Ala. 35209
(205) 870-7910

Arkansas
Dunhill
608 University Tower
Little Rock, Ar. 72204
(501) 664-4040

California
Dunhill
770 B Street—Ste. 204
San Diego, Ca. 92101
(714) 238-1331

California
Dunhill
500 S. Main Street—Ste 418
Orange, Ca. 92668
(714) 547-6133

California
Dunhill
200 New Stine Road—Ste. 110
Woodrise Bldg.
Bakersfield, Ca. 93309
(805) 834-6280

California
Dunhill
2422 Arden Way—Ste. 28
Sacramento, Ca. 95825
(916) 929-3475

California
Dunhill
6404 Wilshire Blvd.—Ste. 1110
Los Angeles, Ca. 90048
(213) 653-5385

Connecticut
Dunhill
26 Sixth Street
Stamford, Connecticut 06905
(203) 357-8288

Florida
Dunhill
3733 University Blvd W.—Ste 104C
Jacksonville, Fla 32217
(904) 731-5566

Florida
Dunhill
Washington Federal Bldg.--Ste 612
633 N.E. 167th Street
North Miami Beach, Fla 33162
(305) 653-2535

Georgia
Dunhill
The Citgo Building
3445 Peachtree St., N.E.
Atlanta, Ga. 30326
(404) 261-3751

Illinois
Dunhill
180 No. Michigan Ave.—Ste 1700
Chicago, Ill 60601
(312) 346-0933

Iowa
Dunhill
121 Prof. Park—119 Third St., N.E.
Cedar Rapids, Ia 52401
(319) 366-8273

Maryland
Dunhill
1000 Century Plaza—Ste. 120
Columbia, Md. 21044
(301) 995-0550

Massachusetts
Dunhill
1515 Mechanics National Tower
Worcester, Ma 01608
(617) 798-0116

Massachusetts
Dunhill
391 Totten Pond Road
Waltham, Ma 02154
(617) 890-8010

Michigan
Dunhill
755 W. Big Beaver Rd.--Ste 423
Troy, Mi 48084
(313) 362-3115

Michigan
Dunhill
2500 Packard Road—Ste 201
Ann Arbor, Mi 48104
(313) 973-0955

New Mexico
Dunhill
2403 San Mateo, N.E.—Ste W-2
Albuquerque, N.M. 87110
(505) 265-8734

New Jersey
Dunhill
1280 State Highway 46
Parsippany, N.J. 07054
(201) 263-5500

New York
Dunhill
342 Madison Ave.—Ste. 1405
New York, N.Y. 10017
(212) 986-0100

New York
Dunhill
60 Madison Manor
Presidential Plaza
Syracuse, N.Y. 13202
(315) 425-9300

New York
Dunhill
512 W. 3rd Street
Westbridge Building - Ste. 106
Jamestown, N.Y. 14701
(716) 664-4210

New York (Long Island)
Dunhill
535 Broad Hollow Road
Melville, N.Y. 11746
(516) 293-0055

North Carolina
Dunhill
1 Woodlawn Green—Ste. 246
Charlotte, N.C. 28210
(704) 554-8771

North Carolina
Dunhill
2534A So. Church Street
Burlington, N.C. 27215
(919) 227-1216

North Carolina
Dunhill
Harbour Square Offices
1620 Harbour Drive
Wilmington, N.C. 28401
(919) 392-1660

Oregon
Dunhill
806 S.W. Broadway
Portland, Oregon 97205
(503) 224-1850

Pennsylvania
Dunhill
10 North Church—Ste. 308
West Chester, Pa. 19380
(215) 696-4360

South Carolina
Dunhill
[illegible] Ave.—Ste. [illegible]
Spartanburg, S.C. 29302
(803) [illegible]

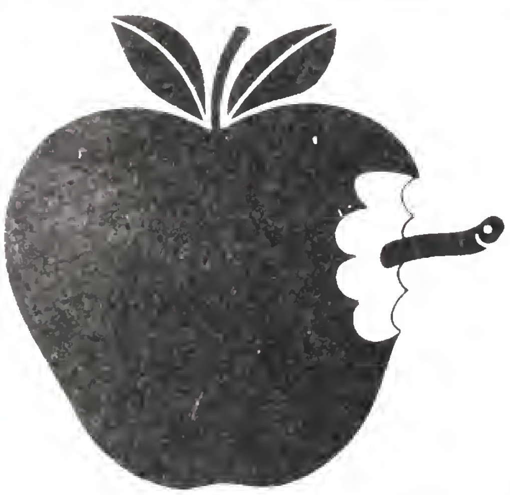
South Carolina
Dunhill
[illegible] No. Main St.—Room [illegible]
Anderson, S.C. 29621
(803) 224-[illegible]

Texas
Dunhill
[illegible]
11211 Katy Freeway
Houston, Tx. [illegible]
(713) 932-0040

Utah
Dunhill
[illegible] Kennecott Bldg.
10 E. South Temple
Salt Lake City, Utah [illegible]
(801) 363-5494

Virginia
Dunhill
4906 Fitzhugh Avenue
Richmond, Va. 23230
(804) 358-2116

Virginia
Dunhill
7015 Keene Mill Road—Ste. 202
Springfield, Va. 22150
(703) 569-3410



Programmers. . . there is a way to avoid unpleasant surprises. Unless you have total information about a given career opportunity you cannot be sure it s for you By using the services of N C A you can be sure You ll not only be shown more career opportunities than you could find elsewhere, you ll also be given complete, detailed data on each, plus the inside information that is vital in avoiding mistakes Call the firm nearest to you No charge to you No obligation Confidentiality assured

National Computer Associates

CHICAGO
Thomas Hirtz and Associates Inc
150 N Wacker Drive Suite 1700
Chicago Illinois 60606
Telephone 312 236 5975

DALLAS
DataPro Personnel Consultants
4255 L B J Freeway
Suite 162
Dallas Texas 75234
Telephone (214) 661 8600

DETROIT
Electronic Systems Personnel
Prudential Town Center
3000 Town Center Suite 2580
Southfield Michigan 48075
Telephone (313) 357 5560

FLORIDA
Data Systems Personnel Inc
Suite 205 5490 N W 7th Ave
Miami Florida 33169
Telephone (305) 685 7891

HARTFORD
Compass Inc
900 Asylum Avenue
Hartford Connecticut 06105
Telephone (203) 549 4247

LOS ANGELES
Constellation Enterprises
Suite 900 3250 Wilshire Blvd
Los Angeles California 90010
Telephone 213 487 0616

MINNEAPOLIS ST PAUL
Electronic Systems Personnel
801 Nicollet Mall Suite 1716
Minneapolis Minnesota 55402
Telephone (612) 338 6714

NEW JERSEY
Systems Search II
75 South Orange Avenue
South Orange N J 07079
Telephone (201) 761 4460

NEW YORK
Bolar Associates Inc
405 Lexington Avenue
New York New York 10017
Telephone (212) 687 0906

NORTH CAROLINA
TaskForce Inc
1046 E Wendover Ave
P O Box 6888
Greensboro N Carolina 27405
Telephone 919 [illegible]

PHILADELPHIA
Systems Personnel
207 Fox Lane
Wallingford Pa 19086
Telephone (215) 565 2920

PITTSBURGH
Electronic Systems Personnel
106 Lawyers Building
428 Forbes Avenue
Pittsburgh Pennsylvania 15219
Telephone (412) 391 6450

SAN FRANCISCO
The Computer Resources Group Agency Inc
303 Sacramento Street
San Francisco California 94111
Telephone 415 398 3535

SYRACUSE
CFA Associates Personnel Inc (Agency)
2530 James Street
Syracuse New York 13206
Telephone (315) 463 5225

WASHINGTON D C
ESP Systems Corporation
Suite 210
1211 Connecticut Avenue N W
Washington D C 20036
Telephone 202 833 8040

KINGDOM OF SAUDI ARABIA

UNIVERSITY OF RIYADH

The University of Riyadh in Riyadh, Saudi Arabia has positions for:

COMPUTER SYSTEM ANALYSTS

QUALIFICATIONS:

1. College degree in Computer Science from an accredited university.
2. Minimum of two years experience in computer analysis and programming.
3. Complete knowlege of Cobol, Fortran and basic computer languages.
4. Must have ability to read, write and understand Arabic as well as English.

Please submit applications and resume along with copies of all available documents (certificates and references) as soon as possible to:

Dean of Admission and Registration
University of Riyadh
P.O. Box 5733
Riyadh, Saudi Arabia

EDP SYSTEMS ANALYSIS MANAGER

$19,136 - $21,111 Annually

The City of Richmond is seeking qualified applicants for the position of EDP Systems Analysis Manager Responsibilities include supervising the Division of Systems Analysis and the activities of the systems development staff Requires college grad. with a degree in computer sciences, math, bus. admin. or a closely related field plus considerable experience in data processing systems analysis & design. Equivalency. Apply by Dec 11, 1978. City Residency. Verify education. Send detailed resume to the Dept of Personnel, Rm. 108, City Hall, 900 E. Broad Street, Richmond, VA 23219. AN EQUAL OPPORTUNITY EMPLOYER

Computerworld recruitment ads get the job filled.

IRAN

salary $45K +
free housing

Applications programmer, Systems Engineer, H-6000 or L/66, GCOS/COBOL/GMAP IDS TPE/MULTICS, US firm has 18-24 mo tours w/fam. Ex financial pkg in Tehran. Ski 1 hr fm office. Rush resume: Cybermetrics Corp., P.O. Box 579, McLean, VA 22101. (703) 356-1997. Other positions avail.

Our Standards Are High They Have To Be

Our Vice Presidents personally hire each programmer/analyst (over 100 will be in 1978) because they know that a professional service firm's FUTURE is YOU.

Immediate nationwide openings include Miami, Detroit, Houston and other southeastern cities, Washington D.C., Baltimore and Philadelphia areas: Call collect or send resume with current salary requirements to:

Mr. Dave Shipe
Data Technology Indust., Inc.
6611 Kenilworth Ave., Suite 413
Riverdale, Md. 20840
Toll Free 800-638-0910
In Maryland (301) 927-4700

OPPORTUNITIES TO LIVE IN SUNNY SOUTHERN CALIFORNIA

Requirements for programmers and analysts with solid experience are critical. Many of our clients will provide relocation assistance If you can visit Los Angeles we will arrange several interviews during your stay All fees are paid by our client companies Reply in confidence to Duncan White

ROBERT HALF
PERSONNEL AGENCIES

3600 Wilshire Blvd.
Los Angeles, CA 90010
(213) 386-6805
500 South Main
Orange, CA 92668
(714) 835-4103

TULSA

UNIVAC SOFTWARE experience required by excellent company to support new Univac 1100 installation. Competitive salary & full relo. expense, beautiful place to live. Contact us today.

2624 E 21st St Tulsa OK 74114
(918) 747-3621

DATA PROCESSING CAREERS inc

The Department of Computer Science at Montana State University is expecting to fill a tenure track faculty position on or before September 1, 1979. Rank and salary are negotiable. Duties include instruction at the undergraduate level, student counseling and research activities. A Ph.D. in Computer Science or a related field is required. Candidates with interest and experience in operating systems, automata and languages will be given preference. Send resumes' prior to February 1, 1979 to:

Gary Harkin
Dept. of Computer Science
Montana State Univ.
Bozeman, MT 59717

MSU is an Equal Opportunity Affirmative Action Employer

DATA PROCESSING COORDINATOR

Administrator for community college computer operation. Minimum requirements: Bachelor's degree, experience in programming, systems analysis, operations of a minicomputer as well as terminal operations with a large main frame computer at another location. Prior supervisory experience and higher degrees preferred. Starting salary: $18,000-$20,000 plus liberal fringe benefits. Send resume to: Ms. Barbera Corcoran, Personnel Manager,

PASSAIC COUNTY COMMUNITY COLLEGE
College Blvd.
Paterson, N.J. 07509
An Equal Opportunity/ Affirmative Action Employer

PREPARE FOR THE 80's WITH US!

The Computer Company continues its dynamic growth pattern providing remote computing services on a nationwide basis. A leader in our field, we offer excellent opportunities for the outstanding individual.

OPENINGS IN NEW YORK, BOSTON, RICHMOND. Additional openings available in other East coast and West coast offices.

TECHNICAL CONSULTANTS

Approximately 60% of your time will be in client contact and the balance in programming. You will have to deal well with middle and upper management, and have a college degree

MARKETING REPRESENTATIVE

At least 1-3 years with a strong sales record in data processing. You should have a college degree and professional expertise to sell Fortune 1000 clients. Outstanding salary/commission plan available.

SALES/BRANCH MANAGER

OPENINGS IN BOSTON, LOS ANGELES & SOUTHWEST. Ground floor opportunity to manage and direct your sales office. Strong sales record with ability to motivate and manage.

PRODUCT SPECIALIST

Research and make recommendations for new applications in the product line. Assist the sales staff in making presentation for prospective clients. Work with the development staff to insure that new and existing applications satisfy client need. Assist the field support staff in client support and installation.

SYSTEMS ANALYST

Design and implement new applications and maintain existing products. Provide technical assistance to the product specialist and the field support staff. Coordinate implementation, documentation and release of new products and enhancements.

ASSISTANT STAFF WRITER

Assist the staff technical writers in all aspects of preparing documentation and promotional material. Advancement opportunities are highly favorable.

THE COMPUTER COMPANY offers excellent salaries and benefits. The way we're growing, opportunities are limitless. Send your resume, including salary history in strict confidence or **CALL COLLECT** to Anne McClary

(804) 358-2171

THE COMPUTER COMPANY
P.O. Box 69, Richmond, VA 23230
Attention Anne McClary
An Equal Opportunity Employer M/F

PROGRAMMER ANALYST

PROJECT LEADERSHIP RESPONSIBILITY

Upper Peninsula

Cleveland-Cliffs is a major iron ore mining and processing Company with extensive interests in energy minerals, Great Lakes Shipping and other natural resources We are offering an excellent opportunity for a growth oriented Programmer Analyst in our Michigan Mining Division Information Systems Department

The ideal candidate will have 5 to 7 years in design and programming of business systems in an OS VS 1, IMS, IBM 370 Series Installation The individual must have an appropriate college degree and enjoy a challenging yet informal work climate

Our Northern Michigan location of Ishpeming offers the advantages of a small town environment and the opportunity to enjoy many outdoor activities in beautiful surroundings Marquette, 20 minutes away, provides a variety of shopping, cultural and educational facilities

We also offer an excellent salary plus year end bonus Our non cash compensation program is Company paid and comprehensive, and includes immediate fully paid family hospital and medical, dental coverage. Life insurance and 3 weeks paid vacation after the first year

For prompt and confidential consideration, please send resume, including salary history or CALL COLLECT

MS K. C. GRIFFIN
The Cleveland-Cliffs Iron Company
C o Industrial Relations Dept.
1460 Union Commerce Building • Cleveland, Ohio **(216) 241-2356**

The Cleveland-Cliffs Iron Company
Equal Opportunity Employer M/F

THIS IS WANG:

Software Development: Career Development.

Innovation and expansion are the hallmark of Wang, and nowhere is this more evident than in our software development sector. Perhaps you're presently in this field and looking for new worlds to conquer. Or maybe you've decided to redirect your career into software development. Either way, Wang is looking for you.

Advanced career development will be yours in the dynamic, high visibility world of Wang. Currently we need a variety of talented professionals from all relevant backgrounds to help us meet the challenges of our own evolution in the positions listed below. If you have abundant ambition and the desire to make great strides forward in software development, then this is Wang, the place for your career.

Data Base Implementors

Want to build a major new DBMS? Get into page formats, indexing schemes, and pointer arrays! Find out how to optimize search paths for complex queries. Program and test algorithms for storage and data structure access. Learn why integrity, protection, and data independence are central concerns of our DBMS. If you think you can benefit from working with some of the best DBMS designers in the world and are already a top-notch implementor of systems software, let us hear from you.

Data Base Systems Designer

You will be a specialist on a design team and perform key functions in designing the architecture of future data base management systems.

This is a highly visible position in our advanced Software Development Group, providing an opportunity to influence DBMS state of the art. If you have experience in data base security, integrity and recovery, and are familiar with the requirements for data communications and distribution of data as well as a strong interest in designs supporting multiple end user interfaces, this position should be of interest to you.

Systems Analyst/ Product Integration Specialist

Our Advanced Computer Development Group is looking for a top-notch systems analyst with good analytical and communication skills to assist in the complex task of integrating current development activity with defined product goals and existing proven software structures. Working on Wang's new 32-bit Virtual Memory Computer Systems, this position offers an extraordinary opportunity for involvement in many facets of the software development for a major manufacturer's general purpose computing system.

If you really want to be effective in contributing to state-of-the-art computer systems development, this is the place. Necessary qualifications include system programming experience, good communication skills, and a record of professional excellence.

Systems Programmer

Our Advanced Computer Development Group is looking for a top-notch Systems Programmer to assist with major development activities in support of Wang's new 32-bit Virtual Memory Computer Systems. Job responsibilities include analysis, design, implementation, maintenance, and documentation of systems software components such as the operating system, compilers, system utility programs, data base management, and networking management.

This position offers excellent professional growth and advancement opportunities. Necessary qualifications include good analytical and communication skills, with system programming experience or a degree in Computer Science.

Systems Analysts Systems Programmers

If you enjoy designing, simplifying, documenting, and explaining complex software systems, come join our Advanced Computer Systems Development Group as a

System Design Documentation Specialist

We have several positions open for competent computer system professionals with good analytical and communication skills to assist in the challenging job of clarifying and organizing the vast body of software design knowledge developed in support of Wang's new 32-bit Virtual Memory Computer Systems. As System Design Documentation Specialist, you'll develop system overview and program logic manuals, maintain functional reference manuals, and help coordinate the flow of product development information to our technical writing department. As collector, organizer, contributor, and editor of these formal technical communications, you'll help develop the common information base needed to support current and future development. By providing clear, organized information on current software structures, facilities, and conventions, you'll help us educate our fast growing research and development staff.

We're looking for capable individuals familiar with operating systems, compilers, data base management, or telecommunication systems, who enjoy creating lucid models and descriptions of otherwise complex structures. These positions offer excellent visibility and numerous possibilities for advancement within the corporation. Necessary qualifications include systems programming experience, competence in reading IBM 360/370 assembly language programs, good communication skills, and a desire for professional excellence.

We are an affirmative action employer

Software Development

Are You Dissatisfied With Commercial Application Programming/Analysis?

Wang Laboratories is looking for several highly competent commercial programmers and system analysts to work in the Advanced Computer Systems Development Group on Wang's 32-bit Virtual Memory Computer Systems. We're looking for people with good commercial backgrounds who are interested in contributing to current development on state-of-the-art business oriented computer systems. We're interested in developing thoroughly integrated systems, human-engineered for ease of use and user/programmer convenience. This is your chance to become involved in compiler, DBMS, operating system or telecommunication development—to affect the quality of available programming and application development tools.

The positions we offer include

- **Systems software development**
- **Commercial language specification, evaluation, and development**
- **Technical support of sales, marketing, and promotional activities**

These positions offer excellent professional growth in a dynamic research and development environment. Minimum qualifications are

- Expert knowledge and experience in at least one commercial language such as COBOL or RPG-II
- A demonstrated knowledge of compiler or operating system architecture
- A history of successful project completions
- Broad knowledge of industry concepts
- A creative attitude towards solving problems

We offer excellent salaries and benefits. Please submit your resume including salary history and indicating position or positions of interest to Gary Blongiewicz, Manager Professional Recruiting, Wang Laboratories, Inc., One Industrial Avenue, Lowell, MA 01851, or call him at (617) 851-4111.

Computers
WANG
Word Processing

SCIENTIFIC & SYSTEMS PROGRAMMERS

Here's your opportunity to work with some of the most advanced computer facilities in the country

Two IBM 3033's interacting with over 250 remote terminals plus 40 mini computers serving specialized applications all help to to keep Pratt & Whitney Aircraft the leader in the jet engine field.

If you have 0–10 years in scientific and systems programming, and wish to broaden your experience, consider the opportunities in one of the following areas.

SCIENTIFIC PROGRAMMER/ANALYSTS
- Computer Aided Design Systems
- Engine Simulations
- Real Time Data Reduction
- Mini/Micro Applications

SYSTEMS PROGRAMMERS
- Real Time (BPM, CP6, NOS, EXEC 1100)
- Mini Computers (RSX-11M, RT-11, DOS, . . .)
- Time Sharing (VM/CMS)
- Batch/Transaction Processing (MVS/JES2/TSO)

A requirement is a B.S. degree in Computer Science, Mathematics, Engineering or related fields.

For immediate consideration, call 1-800-243-3342 toll free or send your resume (including salary history) to Professional Recruitment, Office 124, Pratt & Whitney Aircraft Group, East Hartford, Conn. 06108.

PRATT & WHITNEY AIRCRAFT GROUP
Commercial Products Division

UNITED TECHNOLOGIES

An Equal Opportunity Employer

TWO IBM 3033'S PLUS

Systems Programmer

Ampex Corporation has immediate openings for Senior Systems Programmers to participate in the systems software development at the corporate computer center. Projects include performance evaluation and capacity planning, user and vendor interface, operating systems generation and maintenance, operations and application programming consultation and problem solution, and program product installation and maintenance. Planned projects include the development of an international teleprocessing network and a corporate minicomputer software support capability.

Successful candidate should possess experience in several of the following areas: MVS, JES2, TSO/TCAM, IMS/VS, BAL, COBOL, FORTRAN, PL/1, BASIC, MPE 3000, NCP or PEP, SMP, SMF, IBM utilities, and JCL.

If you are ready to apply your experience in a dynamic, results-oriented environment, write or call Ampex Corporation, Programming Staff, 401 Broadway, MS 2-20, Redwood City, CA 94063. (415) 367-2600. An Equal Opportuntiy Employer M/F.

AMPEX

Mini-Computer Programmer

PDP 11/45 7/32, 8/32 DG NOVA SEL 32/55, HP 3000, Honeywell Level 6 H 716, Two years exp. Req. Suburban Virginia & Md. locations. U.S. Citizenship req. $17-23K. Relocation Pd. Rush resume: **Cybermetrics Corp., P.O. Box 579, McLean, VA 22101 Tel (703) 356-1997. Other positions** avail USA & OS.

FT. WORTH

Programmer Analysts: Distributed processing development project, COBOL, degree a must. Following exp helpful: retail/wholesale distribution, DB (TOTAL), on-line, distributed processing. $16 to Mid 20's.

Suite 911 One Summit Ave
Ft Worth Tx 76102 (817)336-4565

DATA PROCESSING CAREERS

Computerworld's classifieds work.

[That's why you see so many of them.]

PROGRAMMER

We are seeking an experienced programmer to join our Information Services Group. It is essential that the Individual have a working knowledge of COBOL, DOS, and JCL. Manufacturing programming experience and knowledge of assembler and RPG would be helpful.

Competitive starting salary, excellent company paid benefits. Please forward resume and salary history to:

Paul Markwood
Abex Corporation
P.O. Box 3250
Winchester, VA 22601

An EOE M/F

HOUSTON

Systems Programmer
To $35,000

Houston-based energy company with IBM 3033's and 168's, TSO, MVS and JES2. SMF exit and installation and maintenance of program products.

CALL JIM FLEMING at (713) 961-3271 COLLECT

or send your resume to:

ROBERT HALF
OF HOUSTON, INC.
"EDP Employment Consultants"
4801 Woodway, Suite 231W
Houston, TX 77056

SYSTEMS ANALYST

Southeastern Massachusetts University has openings for a qualified individual to participate in the design, development, implementation and delivery of administrative information and data processing support systems for the University. Systems utilized in this area will be developed for a DECSYSTEM-20 using data base techniques.

Qualifications: Information Services include a Bachelor's Degree plus at least five years' significant experience in computer systems and programming. The successful candidate will have a demonstrated capacity to function effectively in educational systems.

Salary Range: $14,000 - $23,914

Send resumes to: Gordon VanBrunt, Information Services, Southeastern Massachusetts University, North Dartmouth, Ma 02747

Application deadline: December 15, 1978

For further information, call Gordon VanBrunt, 617-997-9321, ext. 303 or 305.

SMU is an equal opportunity/affirmative action employer. Applications from minority groups and women are particularly encouraged.

MAJOR EXPANSION COMPUTER SPECIALISTS

Outstanding career opportunities in Albany, NY are now open with our client, a Fortune 300 consumer products company with corporate headquarters in Upstate, NY. Upstate NY offers a Suburban/Rural environment with excellent recreational facilities as well as many cultural activities. It is situated in the foothills of the Adirondack Mountains, just minutes from Lake George and Saratoga Springs, NY

SR. SYSTEMS ANALYST

Your 3-5 years experience should have given you a thorough knowledge of Inventory Control, Order Entry and Financial Systems experience on a large scale. Ability to interface at the corporate level is a firm prerequisite. BS required, MBA preferred but not essential. Salary range depends on qualifications and experience.

SR. FINANCIAL/ANALYST

2-5 years manufacturing or business experience is required for this corporate position. Outstanding visibility to financial positions within the total corporation. Salary range to $25,000.

ENTRY LEVEL ANALYST

Recent Computer Science graduate with MBA or work completed towards a masters degree qualifies for this newly created position. High level achiever with strong desire to achieve at the corporate level are firm requirements.

Forward all resumes to Angelo R. DiThomas at

CAREER ADVISORS
725 Wolf Road-Albany, N.Y. 12205 (518) 458-1810

Our client assumes all interviewing expenses, relocation expenses and fees.

CRAY RESEARCH, INC.

CRAY Research is a special company with a unique product line. We design, build, market and support Super Scale Scientific Computer Systems. We have opportunities in California, Colorado, District of Columbia, Minnesota, Missouri, New Jersey, New Mexico, Texas and Washington:

SALES SUPPORT ANALYSTS

- Pre-sales technical support to field marketing.

PROJECT MANAGERS & FIELD ANALYSTS

- Post-sales technical management and support at a customer site.

SYSTEM SOFTWARE DEVELOPMENT PROGRAMMERS

- Operating system and FORTRAN compiler development.

Please state the POSITION of your interest and GEOGRAPHIC PREFERENCES. Mail your resume, with salary history plus CURRENT SALARY REQUIREMENT to:

CRAY RESEARCH, INC.
75 Manhattan Drive - Suite 3
Boulder, Colorado 80303

An Equal Opportunity Employer m/f

SENIOR PROGRAMMER/ANALYST

THE UNIVERSITY OF CHICAGO

A career position is available in the university's Computation Center as a project leader for coordinating the installation of a major Financial Accounting System. The base system in COBOL will be accepted in January, 1979 and will be received with university departments. Revisions and editions will be defined and implemented along with forms design, procedure development, training and installation. This key individual will lead the systems team through these tasks over a 2 year period after which new projects will be defined.

Qualified applicants will have accounting application experience, 5 years of OS JCL and COBOL system development experience and substantial negotiating and leadership skills. Excellent university fringe benefits accompany this challenging position. Send your resume with salary requirements, in confidence to:

Mr. JOE ARNOLD
Manager Information Systems
Computation Center
THE UNIVERSITY OF CHICAGO
5737 University Ave.
Chicago, Ill. 60637
An Affirmative Action Equal Opportunity Employer

Programmers, Analysts, Software Specialists

We are Specialists Too!

We can put you in touch with openings from coast to coast regardless of geographic preference. Contact the nearest NPA affiliate listed below for confidential service. All fees employer paid.

COMPUTER CAREERS INC.
4424 Montgomery Ave.
Suite 200
Bethesda, MD 20014
(301) 654-9225

SUPERIOR RESOURCES
16400 Ventura Blvd.
Suite 339
Encino (LA), CA 91436
(213) 986-4400

BUTTERFIELD'S EMPLOYMENT SERVICE
161 West Wisconsin Ave.
Suite 269
Milwaukee, WIS 53203
(414) 278-7800

D. BROWN & ASSOCIATES, INC.
610 S.W. Alder
Suite 711
Portland, OR 97205
(503) 224-6860

RIKER PERSONNEL
8790 Purdue Road
Indianapolis, IND 46268
(317) 298-9911

ANDERSON-TAYLOR
P.O. Box 21
Exton, PA 19341
(215) 363-1603

Over 200 members
in 135 metro areas

National
Personnel
Associates

SR. ANALYST

Major Philadephia Financial Institution is presently seeking an experienced COBOL Analyst to direct the design and supervise the implementation of Financial Data Systems.

ideal candidate will have at least 5 years experience as a development and design analyst with user interface at the officer level in a 370/OS environment. Financial Systems application background is required. Accounting background is desired.

Excellent benefits with compensation based on experience. Send confidential resume and salary listing to:

M-2, P.O. Box 17182
Phila., Pa. 19105
Equal Opportunity Employer M/F

REOPENING POSITION FOR DIRECTOR OF COMPUTER SERVICES

Responsible for all instructional, research, and administrative computer services. Current environment includes IBM 370/135 with DOS/VS, and CICS, DEC PDP 11/70.

Minimum requirements are 6 to 8 years of demonstrated leadership in academic, research or high technology industrial setting. Considerable knowledge of current state-of-the-art hardware, software and telecommunications in a college or university (including a College of Medicine) is desirable.

Master's Degree is required; however, a Doctorate in Computer Science, Business Management, Mathematics or a related field is preferred.

Salary consistent with top level University administrative responsibilities.

Please send resume by December 15, 1978 to:

Director of Personnel
East Tennessee State University, P.O. Box 24070A
Johnson City, TN 37601
The University is an Equal Opportunity Employer

Head of Computer Center

Mississippi State University is seeking candidates for the position of Head of the Computer Center. Position responsibilities include management of a large-scale central computer, coordination with user personnel, leadership in systems development and long-range planning, supervision of approximately 35 employees, and the possibility of part-time teaching. Position also includes the possibility of academic appointment.

A large-scale Univac 1100 system provides computer support to teaching, research, service, and administrative data processing.

Applicants must meet the following requirements: doctorate in Computer Science or a related field; managerial, systems programming and/or programmer/analyst experience in large-scale computing; demonstrated state-of-the-art knowledge of computing.

Salary open. Send resume by February 1, 1979 to:

Dr. Fred Davis, Director
Division of Computing Affairs
Mississippi State University
P.O. Draweer CC
Mississippi State, MS 39762
Mississippi State University does not discriminate on the basis of race, color, religion, national origin, sex, age or handicap.

Sun
Sun
Sun
Sun

Sun
Sun
Sun
Sun
Sun
Sun
Sun

Sun
Sun
Sun
Sun
Sun
Sun
Sun

Sun
Sun
Sun
Sun
Sun
Sun
Sun

Sun
Sun
Sun
Sun

SALES/SERVICE SUPPORT

Data Processing/ Telecommunications Marketing Professionals

SUN INFORMATION SERVICES COMPANY INC., (SIS), a new, wholly owned subsidiary of Sun Company, Inc., (formerly Sun Oil Company) markets a complete line of data processing products and services, nationwide. Due to our success and expansion, we are presently seeking professionals in these fields:

SALES MANAGER
Princeton, N.J. Based

Will manage micrographics sales and operations in Princeton. Data Processing sales/service background or COM background required. Successful candidate will sell micrographics only. Salary base $20, to $25,000 plus incentives.

ACCOUNT MANAGER
Network Services
Princeton, N.J. Based

Will be responsible for the marketing of SIS products and services. Duties will include the development of formal proposals, the development and implementation of strategies for finding new accounts as well as customer liaison and support. The successful candidate must have direct sales experience, knowledge of the marketplace in question, excellent communications skills and, preferably, possess a college degree. Salary base Mid-$20's plus bonus. (Dept T.W.)

FIELD SUPPORT REPRESENTATIVE
Network Services
Princeton, N.J. Based

Responsible for activities associated with support of new and existing data processing products. Must have extensive experience with mini and micro computer hardware and software. Must be able to communicate effectively. Salary base $20, to $25,000 plus incentive. (Dept. T.W.)

BRANCH MANAGER
Philadelphia Based

We seek proven D.P. Sales Professionals who have developed formal proposals and implemented strategies for developing new business and can provide customer liaison and support. MUST be familiar with the D.P. marketplace in question and possess a proven successful background in D.P. sales. Compensation structure includes excellent base salary, sales incentives and comprehensive benefits. (Dept. M.R.)

NATIONAL ACCOUNTS MANAGER
Valley Forge, Pa. Based

The successful applicant will have demonstrated ability in the development and implementation of programs for securing national accounts for SIS. This position provides excellent earnings, including a substantial base salary, incentive bonus and a complete benefits package, as well as opportunities for unlimited career and financial growth. MUST possess a proven record of success in D.P. sales and have knowledge of the national D.P. marketplace. (Dept. M.R.)

TELECOMMUNICATIONS CONSULTANT
Philadelphia Based

Successful candidate will play a key role in the marketing of SIS SUNGARD Telecommunications services by providing pre-sale support and expertise in analyzing potential customer needs and developing solutions. You will present and promote our data communications network approach, as applied to customer requirements by means of formal technical proposals and on going consultation with both the potential customers and SIS's technical staff. Position requires a thorough knowledge of telecommunications and IBM implementation codes and protocosl, excellent written and oral communications skills and an Engineering Degree or equivalent experience. (Dept. R.F.)

SYSTEMS SOFTWARE ANALYSTS
Philadelphia Based

Positions are responsible for the development, maintenance, testing and support of the operating system for an IBM 370/168 at our new Sungard Computer Center. In addition you will consult with customer's technical personnel in the development of their IBM Operating System. To qualify you must be experienced in SYSGENing and MVS/JES 2 Operating System, and/or TSO/TCAM, VTAM and 3705 Emulation. Must possess superior written and oral communications skills, degree in Computer Science, or related field preferred. (Dept. A.C.)

SIS is experiencing unexcelled growth and can provide its employees with exceptional opportunities for technical challenge, professional satisfaction and career advancement. Interested applicants should send their resume to the Department listed with the position desired and send to: Mr. J.S. Stewart, **SUN INFORMATION SERVICES COMPANY, INC.**, 1600 Walnut St., 12th Floor, **Philadelphia, Pa. 19103.** Affirmative Action Employer, M/F/H/V

Sun INFORMATION
SERVICES
COMPANY

PROGRAMMER/ANALYSTS

Candidates must be familiar with structured programming and/or design techniques, as well as a variety of high level languages. We seek individuals who will maintain the currency of their knowledge of computer sciences while utilizing their excellent basic skills. Positions are available in all levels in both Montpelier, Vermont and Denver, Colorado.

DATA BASE DESIGNER

We are seeking a versatile and creative individual to work on the design of a large, complex, integrated data base. Previous involvement with this type of design effort is required, as well as experience with a variety of DBMS protocols. Knowledge of data base structuring must be current and thorough. This position is in Denver, Colorado.

Our company is a well known leader in public policy analysis and research. We are currently engaged in several major projects, including the automation of public welfare administration in several states. Our approach is interactive, distributed, and includes an extremely flexible software design.

Candidates can expect salaries ranging from $17,000 to $30,000 and excellent advancement possibilities.

We will be holding interviews for qualified candidates during the week of the ACM Conference, Dec. 4-8, in Washington, D.C. Please call Pam Tarwater at (303) 837-1500 (collect) for an appointment.

If you are not going to be in Washington, D.C., please send your resume, salary history, and location preference to:

Placido Herrera
Mathematica Policy Research
1410 Grant St.
Denver, CO 80203

Computing Professionals

**Utilize your skills fully...
and benefit accordingly...
with COMSHARE.**

ARE YOU A RESULTS-ORIENTED TECHNICAL TEAM PLAYER? Do you take pride in what you do as an individual, but also appreciate the satisfaction of working closely with highly competent technical colleagues? Do you want the visibility—and the rewards—that go with full utilization of your skills?

Consider COMSHARE We are looking for people who know they are better are willing to prove their value and can deal with success We have the following senior-level openings

TECHNICAL PROGRAM MANAGER

BS, MS, or MBA and 5 years or more of experience in software/hardware development line management or product/program management functions

SYSTEMS ANALYST

BS, MS, or equivalent with at least 5 years of experience in the data processing industry *Also required* Ability to evaluate systems configurations functionality content and performance characteristics of computer vendors and competitor computer service companies

COMMUNICATIONS/NETWORKS PROGRAMMERS

BS degree or equivalent and at least 2 years experience in developing operating system software internals

COMSHARE [illegible] growing international computer services [illegible] headquartered in Ann Arbor, Michigan - research center of the Mid[illegible] [illegible] positions command excellent salaries and fringe [illegible] *[illegible] people think we're a fun place to work*

[illegible] resume to **Donald M. Vuchetich, COMSHARE, INC., PO Box 1588, Ann Arbor, MI 48106.** We're an equal opportunity employer M F

COMSHARE®

EDP OPPORTUNITIES

EDP Audit Mgr-Big 8 or maj Fortune corp exp. Establish new grp $30-35K
PROJECT Ldr - Pension retirement system. Database on line $28K
Performance Software Anal-install software security systems for Fortune co. 3032 Monitor & tuning exp a must. Identify MVS software problems. IMS a plus $27-35K
Institutional, Fincl systems development-maj systems conversion DOS & OS Cobol desired. Sales, trading, mktg support $29K+Bon
ASST Dir Data Proc Process-admin responsibil for 22 professionals DOS Cobol/RPG $25K
DATABASE Admin-M.I.S.-data dictionary DL 1, D.C. $30-33K
Process Cntl syst anal PDP 11 Fortran 4 realtime. Automated storage retrieval. Pd relocation $27-33K
Sales EDP - salary no commission Min 2 yrs+ mini, medium or lge scale-technical engineering-banking-laboratory products or capital equip exp $20-35K
PL 1 - Cobol programmer anal Westchester. $22K
CHICAGO - mgmt sci/O.R. develop hi level financial quantat. model FOCUS RAMIS XSIM-XPRESS $35K
Interactive systems anal-tech degree database mgt systems, fincl plan'g. $30K
Mgmt Sci/OR anal-chemical, pharmaceutical, or int'l corp exp $25-28K
HV 3000 Cobol on line data base developmt. $21-23K
PDP 11 DIBOL/COBOL RSTS/E. $27K

FOREIGN ASSIGNMENTS

DATABASE design analyst-TSS/TSO IDS Honeywell 6000 series hardware. $40-45K
Prog Anal - Honeywell 6000 series COBOL TSS/TSO. $35-41K
Teleprocessing specialist-4 yrs exp 2 yrs in teleprocessing. General knwldge of GCOS, TDS, GRTS,/TSS. $40-45K
Software Anal - Honeywell 6000 series software GCOS, GMAP,/GRTS. $36-42K

Interview arrangements including round trip airline tickets, 1 nite hotel stay, per diem allowance for meals & misc expense & briefing program company paid.

NORTHEAST

Software Anal - IMS PSP Gen's 3033 maj developmt $Open
Institutional fincl corp seeks on line banking CICS swift knwldge &/or realtime security dev knwldge. $27-31K
Systems Assurance - group ldr OS MVS. $30-32K
Proj Ldrs OS COBOL-health care or admin systems. $29K
MINIM compute stems anal-multi mini computer knwldge-hands on exp prog nec. $27-31K
Communications anal 65 migrating 3032's 370 VS IBM series 1 data communications. $27-31K

Bill Borrelli (212) 349-3610

William Harris Assoc
150 Broadway agency NY 10038

PROGRAMMER

We have an immediate opening for an individual with the following qualifications. Must have experience with IBM 370 computer with OS or MVS operating systems. Will have opportunity to work on IBM 30-32. Must be proficient in Cobol, have knowledge of TSO.

Solid business experience with industrial environment is desirable, experience with on-line interactive information systems helpful.

Excellent salary and complete program of company paid benefits, make this an outstanding opportunity.

Call Mrs. G.W. Rogers for appointment.

**SPECIAL METALS CORP.
NEW HARTFORD, N.Y.
(315) 798-2924**

An Equal Opportunity Employer

EXPERIENCED ANALYST/ PROGRAMMER

Denver, Colorado

The Education Commission of the States, a Denver-based education research organization, needs experienced computer analyst/programmers who will design, program, run and maintain statistical and/or database software. Desired background: programming and/or design experience in scientific and/or large database applications. Knowledge of statistics, PL/1, statistical packages, or data management systems a plus. Salary range: $13,957 - $23,361 annual, commensurate with experience. Excellent fringe benefits, including four weeks vacation.

Send resume together with samples of work to ECS, 1860 Lincoln Street, Suite 784, Denver, Colorado 80295. ATTN: Data Processing Department, Interviews will be conducted in Washington, D.C. on December 4-8. Call Cathy Pfau at (303) 861-4917, ext. 276, to arrange an interview.

ECS is an equal opportunity, affirmative action employer. M/F.

**Western Australian
Institute of Technology**

Visiting Lecturer in Systems Analysis and/or Programming

Applications are invited from suitably qualified and experienced academics or practitioners for a ten month lecturing contract commencing 1st February, 1979.

The department requires a lecturer, to replace staff currently on study leave, to teach in the following areas: Systems Analysis and Design, Data Base, Programming in Cobol, Fortran, Basic at the Assembly level. Experience in at least two of these areas would be an advantage.

A remuneration package would be negotiated depending on the qualifications and experience of the appointee but a single return airfare and a salary of $A1250 per month can be taken as a guide.

Enquiries should be directed to the Head, Department of Computing and Quantitative Studies, Western Australian Institute of Technology, Hayman Road, South Bentley, Western Australia, 6102, by the 21st December, 1978.

When applying please quote reference number 096 CW4.

THERE'S A RIGHT WAY TO DO THINGS.

And at Rogers & Sands, we've been doing things the right way since 1959. We've earned a reputation for successfully matching the right people to the right positions. We have done so with the highest ethical conduct, with unquestionable integrity, and with proven results.

Through us, you can explore a wide range of job opportunities in New England and throughout the country In complete confidence.

There's a right way to do things Send resume with salary requirements and geographical preference, or call Ted Chaloner, (617) 426-4180.

ROGERS & SANDS
100 Federal Street, Boston, MA 02110
Member National Computer Associates

CDI

SALES REPRESENTATIVES

For Computer Devices, Inc.

Leading manufacturer of computer terminals has immediate positions open in the following areas:

New York City	New Jersey
San Francisco	Los Angeles

Minimum of 3 years successful field sales experience is required. Some technical or software knowledge is preferred, but not necessary.

We offer competitive salary, commission, company benefits, and expenses.

Qualified individuals should send resume, including salary history, and requirements, to:

COMPUTER DEVICES, INC.
25 North Avenue, Burlington, MA 01803

An Equal Opportunity Employer M F

PROGRAMMERS AND ANALYSTS

Free Employment Service
Northeast, Southeast & Midwest U.S.

Scientific and commercial applications • Software development and systems programming • Telecommunications • Control systems • Computer engineering • Computer marketing and support

Call or send resume or rough notes of objectives, salary, location restrictions, education and experience (including computer models, operating systems and languages) to either one of our locations Our client companies pay all of our fees

RSVP SERVICES, Dept. C
Suite 700, One Cherry Hill Mall
Cherry Hill, New Jersey 08002
(609) 667-4488

RSVP SERVICES, Dept. C
Suite 300, Dublin Hall
1777 Walton Road
Blue Bell, Penna. 19422
(215) 629-0595

RSVP SERVICES
Employment Agency for Computer Professionals

Southeast D.P. Opportunities

Want out of the cold winters into the sunny Southeast? We have immediate openings with the most progressive clients in the Southeast & nationally for Systems Analysts & Programmers. Salary ranges to $30K. If interested send resume or call Continental Personnel, Inc., P.O. Box 11321, Charlotte, NC 28209 (704) 525-2160.

BANK DATA PROCESSING

If you are a D.P. professional be a professional in seeking challenge and advancement. We represent leading financial institutions with centers throughout the Western states. We are seeking proven specialists at all levels in Financial D.P. Experience in creating and maintaining Processing and Management Systems provides you outstanding potential. Contact immediately...Mike Seeliger at

FOUST, DIER AND ASSOC.
10604 N.E. 38th PL
Suite 103
Kirkland, WA 98033
(206) 827-8743

Balt/Wash Communications Dlv. of Fortune 500 Co. seeks a **BUSINESS SYSTEMS PROGRAMMER/ANALYST** with 3-5 yrs. COBOL, OS/-MVS, TSO, Inventory and Shop Floor Control. Mfg. Systems with DMBS, CICS are ++. Exc. b'nfts with relocation paid. Send resume and salary requirements.

ROBERT HALF
PERSONNEL AGENCIES, INC.

7316 Wisconsin Ave., Wash. D.C. 20014 (301) 652-1960

217 The Quadrangle, Balt., Md. 21210 (301) 323-7770

PROGRAMMERS

IBM DOS/VS installation seeking ambitious individuals with computer science background and/or past programming experience to work in a bank service environment. We offer an opportunity to become involved in major application software development in a CICS/VS setting. This undertaking would provide excellent growth potential particularly for the person desiring to grow toward a future systems analyst position. In addition to attractive salary and benefit programs, we offer pleasant professional surroundings and the opportunity to be associated with the latest in IBM hardware and software systems. Please contact:

Ronald D. Long AVP
BRENCO AUTOMATION CENTER, INC.
717 Mulberry, Suite 503
Des Moines, Iowa 50309
(515) 283-2415
A subsidiary of
Brenton Banks, Inc.

WHEN PULLMAN STANDARD TALKS

DATA PROCESSING

E.F., AND ALL THE OTHER HUTTONS, SMITHS, & JONESES LISTEN.

They listen because we are embarking on projects that will lead to one of the most sophisticated, telecommunications-based, on-line systems in the heavy manufacturing industry. Right now we are expanding telecommunications and data base systems into all areas of production including manufacturing, materials control, cost control and labor management. This means outstanding career opportunities for the following individuals who join us now:

SENIOR PROGRAMMER ANALYSTS
PROGRAMMER ANALYSTS
SYSTEMS ANALYSTS

Pullman Standard is the largest manufacturer of rail cars in the free world. Our salary and benefit package is outstanding. If you're at home in an environment of IBM 360/370's, OS and VOS, using JCL and COBOL, come talk to us. We have a lot to say.

For more information, send a resume or call collect:

Joe Elias, Employment Manager
312/322-7328

Pullman Standard
200 S. Michigan, Chicago, IL 60604

An Equal Opportunity Employer m/f

DATA PROCESSING PROFESSIONALS

SR. PROGRAMMER ANALYST – Financial/Administrative OS/MVS/IMS – TEXAS	$20,000
SYSTEMS ANALYST – Utility/Service, OS,VS1, IMS, TP Network – CAROLINAS	$21,500
PROGRAMMER ANALYST – Commercial/Service COBOL, IMS, TSO, VSAM – FLORIDA	$21,000
SYSTEMS PROGRAMMER – TCAM Intervals, ASP Version 3, JES 3, MVS – CONNECTICUT	$25,000
SR. PROGRAMMER ANALYST – Manufacturing, on-line systems, IDMS, – OHIO	$23,000

All expenses including fees and relocation are paid by our client companies. For further information regarding these and other opportunities available – NATIONWIDE – Please call or write Joseph Miglizzi, CEC, (203) 249-9177

availABILITY, INC.

750 Main Street
Hartford, Conn. 06103

Fortune 500
Recruiting

Nationwide
Exposure

Management Profiles, Inc.

a name SYNONOMOUS
with COMMUNICATIONS

Directors
V.P.'s
Managers
Analysts
Technicians

(212) 221-1870
Allan Davis
Harvey Rogers
516-5th Avenue
New York NY 10036

PHILADELPHIA

INSURANCE PROFESSIONALS

Capitalize on your technical expertise & join a team of outstanding EDP professionals in the INSURANCE INDUSTRY.

Our client, a PHILA area based Natl INSURANCE firm has been experiencing unprecendented growth. To keep pace, top mgmt has undertaken a massive upgrading of the EDP staff. They have retained us to identify seasoned technicians for the following top priority openings.

SYSTEMS MGR

Results oriented administrator to establish productive environ. HEALTH INSURANCE SYS expertise from 370/COBOL environ nec

$30,000

DATA ENTRY MGR

Superb DIPLOMATIC SKILLS reqd to supervise lge dept. Bkgd SCHEDULING, JOB SET-UP & I/O quality control.

$25,000

SYSTEMS ANALYST

HEALTH INSURANCE sys expert. Creative thinker to bring "LIFE" to under utilized dept.

$25,000

SR PROGRAMMER

"Insurance , Sys Generalist" from 370 OS/VS COBOL environ. Aggressive, self-starter will move quickly into ANALYST spot.

$25,000

PROGRAMMER/ANALYST

PERSONNEL, EMPLOYEE BENEFITS & PENSION SYS bkgd. COBOL proficiency from 370 environ essential.

$23,000

H6000 OPERATOR

Lge shop H6000 exp essential. Any GECOS a +.3 day week. Rapid promotion.

$14,000

We welcome company inquiries

For full details of these FEE PAID positions, please call for immediate interview apointment or forward resume to our recruitment specialist, Wayne Robison, at:

This is a partial listing

ROBERT HALF
OF PHILADELPHIA, INC.

2 Penn Center
Plaza
Phila, PA 19102
(215) 568-4580

EDP AND FINANCIAL PERSONNEL . . . EXCLUSIVELY

Systems Programmers/Applications Programmers

We are looking for data processing professionals with the following qualifications.

Systems Programmer (Univac)

Two to five years systems programming experience with VS/9 operating system on 90/60 (or larger) system. Assembler language skills required, COBOL desirable. VICAM experience highly desirable.

Applications Programmer (Univac)

Two to four years applications programming experience. VS/9 assembler language skills a must. On-line system experience and COBOL skills highly desirable.

Systems Programmer (IBM)

Two to four years systems programming experience with DOS/VS and POWER. S/370 assembler and COBOL language skills. CICS, SPM, VSAM, 3270 experience desirable.

Applications Programmer (IBM)

Two to four years application design and development experience. with S/370 COBOL language skills, CICS experience. Financial accounting experience, assembler language, 3270 experience desirable.

Biomedical Reference Laboratories is a private clinical laboratory with an on-line computer network that operates in over 25 states. Attractive fringes include an excellent benefits package, beautiful new facilities, and a desirable area in which to live and work. Send current resume to **Personnel Dept., P.O. Box 2230, Burlington, NC 27215**. EOE M/F

PROGRAMMER ANALYST

Progressive Manufacturer with a nationwide network of wholesale and retail centers has an opportunity available for an individual with 2 years of experience. Requirements include current programming skills in RPG II, IBM Systems 3 and a background of Commercial Application.

We offer an excellent salary and work environment to the self reliant professional with the desire to excell. All replies will be kept confidential.

Personnel Mgr.
CW Box 1774
797 Washington St.
Newton, MA 02160

SAN FRANCISCO DP TRAINER POSITIONS

BANK OF AMERICA HEADQUARTERS

In—house programming instructors needed for the following areas: COBOL, OS-370, ALC, STRUCTURED PROGRAMMING, DESIGN AND ANALYSIS. Salary commensurate with experience. Send resume to:

Dept. 3411, P.O. Box 37000 San Francisco, CA 94137
ATTN: B. Rowe

An Equal Opportunity Employer M/F

BANK OF AMERICA

KANSAS CITY

Sys Prog, EXEC 8	24K
Sys Prog, CICS	22k
Tech Writer	20k
COBOL, P/A	24k
DP Mgr, S/3	24k
Consultant	25k
S/3 P/A	23k
Sys Prog, MVS	22k

6405 Metcalf Shawnee Mission,
Kansas 66202. (913) 236-8288

DATA PROCESSING CAREERS inc

PROGRAMMER ANALYSTS

Excellent salary, liberal fringe benefits in a mountain setting in Utah. Sportsman's paradise working for a sporting goods company. Technical expertise with excellent communications skills and five years programming experience required, including use of COBOL and BAL for a virtual operating system. Send resume and salary requirements to:

BROWNING
Route 1
Morgan, UT 84050
ATTN: Kandy,
Data Processing

SYSTEMS ANALYST/ PROGRAMMERS

Responsible for the design, coding and testing of an on-line local Government Accounting System including systems testing, user training, and preparation of final documentation with some experience with IBM 370/VM VMS and CICS. Minimum qualifications require equivalent of a Bachelor's degree with 1 to 2 years effective experience.

Submit resumes including salary requirements to:

Sedgwick County
Personnel
510 N Main
Wichita, KS 67203

HOUSTON

The need is still growing for PROGRAMMERS, PROGRAMMER/ANALYSTS and PROJECT LEADERS in the Houston area. All types of hardware, operating systems, data bases, languages and applications. CALL JIM FLEMING at 713-961-3271 COLLECT or send your resume to:

ROBERT HALF
OF HOUSTON INC.
"EDP Employment
Cpnsultants"
4801 Woodway, St 231W
Houston, TX 77056

MANAGER DATA PROCESSING

Indiana General, a manufacturing organization headquartered in Valparaiso, Indiana, has an immediate opening for a data processing professional who will have complete responsibility for programming and operations. RPG II programming experience required with CCP experience desirable. Additional qualifications should include exposure to manufacturing software (IPICS) and hands-on experience with System 3/15D

The position reports directly to the Division President and includes a competitive salary and comprehensive benefits package.

Please submit resume to
Jim Warheit

Indiana General
405 Elm Street
Valparaiso, IN 46383

An Equal Opportunity Employer M/F

OPERATIONS MANAGER HONEYWELL 66/10

We are a highly successful retail chain headquartered along Lake Michigan in the beautiful western Michigan area.

Our corporation is growing to meet the need of our farm and suburban customers in a 3 state area. An important part of that growth is the contribution your talents can make. We are looking for an individual with a solid background in operations management of a medium scaled installation. If you relate well with people, are interested in a growth opportunity and want to join a progressive company we would like to hear from you. If interested please send your resume or a brief letter indicating your previous experience and salary requirements to:

QUALITY FARM & FLEET INC.

Director of Personnel Services
QUALITY FARM & FLEET, Inc.
1460 Whitehall Rd.
North Muskegon, Mich. 49445

An Equal Opportunity Employer M/F

Financial institution in Michigan's Upper Peninsula has immediate openings:

SYSTEMS ANALYST/PROGRAMMER

Position is responsible for analyzing, designing, coding and implementing systems, projects or upgrading of operational system. Reports to Manager - Systems/Programming.

Competitive candidate should have: 3-6 years systems analysis and programming experience; proven COBOL skills; and IBM DOS exposure. Helpful experience will include: SDLC TP; basic assembler language; 3270 TP; and financial systems.

SYSTEMS PROGRAMMER

Responsible for analyzing, implementing and maintaining operating system and related software. Reports to Manager - Systems/Programming.

Competitive candidate should have IBM DOS exposure and proven basic assembler language ability. Helpful experience will include: COBOL; SDLC TP with 3270 and/or 3600; NCP/VTAM experience.

Send a resume indicating position preference including salary history to:

CW Box 1772
Newton, Ma. 02160

An Equal Opportunity Employer M/F

SR. OPERATING SYSTEMS ANALYST

Major Philadelphia Financial Institution is presently seeking an experienced Analyst to manage a systems conversion from VSI to MVS.

Ideal candidate will have 5 years experience in designing, programming and maintaining operating system software in a S/370/OS/VS environment. Project leader experience would be desirable.

Excellent benefits with compensation based on experience. Send resume and salary listing to:

M-1, P.O. Box 1924
Phila., Pa. 19105

Equal Opportunity Employer M/F

MS&S **Murphy, Symonds & Stowell, Inc.**

DATA BASE ANALYST

Proven Admin, Stand & Proc, User Interface, IBM Environ, 3 yrs min + deg. 1800-2100 mo.

PROG/ANALYST

3-5 yrs Design & Prog. BAL-CICS MVS Cobol a + 1600-2000 mo.

Call (503) 224-9575, or send resume in confidence to:
811 S.W. 6th, Suite 710
Portland, OR 97204

D.P. MANAGER

Engineering applications. MSEE 5 yrs Management. To $36K.

SR. PROG/ANALYST

#1 Northwest Center, COBOL, Fortran, Degree. To $23K.

Call (206) 623-6790 or send resume in confidence to:
2200 6th Ave., Suite 1200
Seattle, WA 98121

PORTLAND **SEATTLE**

All Fees Employer Paid

systems representatives

Pansophic Is Planning the Software Systems of the 1980's TODAY!

There's no better time to consider a major career move to Pansophic than right now! Escalating marketing success resulting directly from innovative new concepts in software technology has created the ideal career growth climate for the talented Systems Representative capable of keeping pace with our ambitious plans for the future.

This important liaison position between customers and sales calls for a professionally motivated individual who enjoys being mobile and dealing with people on a continuous basis as well as becoming actively involved with installation, implementation and customer instruction at system sites. Current openings are in Chicago, Dallas, San Francisco and McLean, Va.

This position calls for excellent communications skills, a thorough familiarity with OS/DOS, 2-3 years system or application programming background, a knowledge of COBOL and/or BAL and on-line programming and/or data base knowledge. A good understanding of PANVALET, EASYTRIEVE, and/or PANEXEC would be considered essential for success. Of utmost importance is the combination of well-defined career goals and a creative approach to problem-solving.

In addition to an excellent salary, incentive and benefits package, the selected candidates will receive indepth training in state-of-the-art software technology and open-ended opportunities for career growth. For consideration, send a resume to Tarie Yee, PANSOPHIC SYSTEMS, INC., 709 Enterprise Drive, Oak Brook, IL 60521, or

Call Collect (312) 986-6026

An equal opportunity employer m/f

PANSOPHIC

CSC

COMPUTER PROFESSIONALS

Plan Your Future Around The Leader!

Computer Sciences Corporation would like to offer you an opportunity for individual development by joining a team that has a commitment to excellence. CSC has achieved international success through its acquisition and retention of the world's largest and finest group of professionals in information sciences business and technology. Grow with the Applied Technology Division of CSC at:

WALLOPS FLIGHT CENTER, VA.

Scientific applications programmer - using DEC PDP-11 in Real-Time environment to develop state-of-the-art data acquisition and data retrieval techniques.

CHICAGO, ILLINOIS

Senior Programmer/Analyst - perform hardware analysis and develop interfacing techniques for mini-computers

SIERRA VISTA, ARIZONA

Computer Programmer - preparation of programs designed to computerized test schedule development for communications systems.

MOUNTAIN VIEW, CALIFORNIA

Computer Engineer - formal training with Sigma 7, 8, or 9. Will maintain four Sigma Computers used in simulation environment, 3-5 years experience required.

MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALABAMA

Senior Member, Technical Staff - 6 years experience in designing, analyzing and coding complex applications to large-scale computers and related equipment.

When you join Computer Sciences Corporation, you become part of an organization that is recognized internationally as the leader in its field. For the above and other opportunities, send resume in confidence to:

Harry Lloyd

COMPUTER
SCIENCES
CORPORATION

Applied Technology Division
6565 Arlington Boulevard
Falls Church, Va. 22046
Major Offices And Facilities
Throughout The World
An Equal Opportunity Employer

SAN DIEGO

Mini-Computer & Software Sales (DEC) 3 years minimum experience in Computer Sales with Gen'l Accounting or Mfg. Applications. Opening for Sales Mgr and Salesman - San Diego, Orange Cro., & Los Angeles area. Fantastic Sales Leads & Opportunity. Contact Mr. Knudsen c/o Digital Data Systems, Inc., San Diego, (714) 292-5855

OUTSTANDING OPPORTUNITY FOR THE THINKING SYSTEMS PROGRAMMER

Total responsibility for the generation, tuning and maintenance of IBM System 370 Operating Systems including:

VM/370
OS/VSI
DOS/VS
CICS

Previous senior responsibility with VSI and CICS is required. VM and DOS knowledge is desirable. Salary commensurate with experience.

Highly desirable rural/suburban area northwest of Philadelphia, Pa. No traffic jams. No city wage taxes. Send resume and salary history in complete confidence to:

Richard A. Jokiel
Manager of Systems Devlpmnt.
Jones Motor
Bridge St. & Schuylkill Rd.
Spring City, Pa. 19475

SYSTEMS PROGRAMMER

Major investment banking firm. 2+ yrs RSTS exp either COBOL, FORTRAN or BASIC. 1+ yrs time sharing environment. If you like to associate with profsnls & want to work with a company of doers, this may be the job for you. PDP-11 exp. $25K F/pd Call Marty Amato

ROBERT HALF
OF NEW YORK, INC.
522 Fifth Avenue
New York, N.Y. 10036
212-221-6500

College instructor

for Jan.-June 1979 semester. Salary range $4,955-$7,687. Minimum qualification, bachelor's degree in business with office machines specialty. Must teach Intro to Business Data Processing and Business Office Machines including mini-computers.

Apply to **Prof. Philip Malafsky, Orange County Community College, Middletown, N.Y. 10940.** An AA/EO employer.

PROGRAMMER/ANALYST

Computer Science or related degree preferred. 5 years experience in data processing including 2 years experience as a programmer/analyst. Experience with on line computer systems preferred. Should be well experienced in IBM/370 DOS/VS environment. Strong IBM BAL Programming. $16,472-$19,765.

Send resume by December 11, 1978 to:

Personnel Department
Middlesex County College
Edison, N.J. 08817

Equal Opportunity Employer M/F

SENIOR SYSTEMS PROGRAMMERS

Needed for new 1100 Series installation. Strong system programming experience required. Univac 1108 EXEC 8 experience a plus. Positions available immediately. Midwest location. Liberal fringe benefits. Send resume to

Systems Architects, Inc.
Thomas Patten Drive
Randolph, Mass. 02368
(617) 961-4840

PROGRAMMER— ANALYSTS

Variety is a Key Factor with AIC

Analysts International Corporation offers you a stimulating environment for personal and professional growth through exposure to a wide variety of assignments and state-of-the-art technology. We provide our client companies with quality services in systems design, software consulting and programming.

We currently have branch offices in Alabama, California, Colorado, Georgia, Illinois, Michigan, Minnesota, Missouri, Ohio, Pennsylvania, Texas and Washington state. Additional branches will be opening soon.

National Openings

Due to our continued expansion, most of our branches have need for quality personnel with 3+ years experience in several of the following areas:

- Proficiency in more than one language (COBOL, RPG, FORTRAN, PL-1, BAL or ALC, Assembler etc.).
- Systems design experience
- Large or small systems experience with business-manufacturing, scientific or systems applications, such as PARS, MRP, PAL, etc.
- On-line (CICS, CCP, etc.) and/or Data Base (TOTAL, IMS, etc.) experience

Additional personnel requirements of a more specific nature also exist. Some of these include, by location:

- **Cleveland:** 5+ years programming in RPG using CCP.
- **Chicago:** 4+ years experience in assembler language on applications or systems programming
- **Dallas:** COBOL and 370 ALC as applied to trust accounting and insurance services
- **Detroit:** 2+ years experience in process controls using IBM System 7 with APG. Experience in IBM 370 OS-VS internals (SYSGENS-PTF's-I/O).
- **Houston:** Experience in production and inventory control systems (MRP, Shop and Master Scheduling, etc.)
- **Los Angeles:** CSC INFONET applications development. Sr. Consultants to perform requirements analysis
- **Minneapolis/St. Paul:** Programming on large Honeywell series 60 and Level 6 mini-computers
- **Seattle:** NC post processor software programmer. H-6000 GCOS COBOL Programmer Analyst.
- **St. Louis:** OS-IMS applications experience. Communications controller internals, IBM System 7 TPMM.

If your qualifications resemble the above requirements and you are contemplating a change in the next four months, we'd like a chance to visit with you. Our salaries and benefits are competitive. We also encourage project consultants to apply.

For confidential consideration, send your resume (including salary history and geographic preference) to:

Jerry N. Buegler

AIC ANALYSTS INTERNATIONAL CORPORATION

7615 Metro Boulevard
Minneapolis, Minnesota 55435

We Are An Equal Opportunity Employer M/F

ARIZONA CALIFORNIA COLORADO

Combine lifestyle & professional growth with one of our Fortune 500 clients. Current needs include software design, distributed processing, systems software, and applications positions. Mainframes, minis, and microprocessor environments for both hardware and software professionals. For confidential consideration contact

ALLEN CASE
& ASSOC., INC.
3030 N. Central, Ste. 916
Phoenix, AZ 85012
(602) 263-1227

PENNSYLVANIA

Eastern and Central PA programming openings.

Computer professionals needed at all levels. Our client companies assume our fees. Please send resume or letter of application. Include desired salary and geographic location. PH (717) 346-2233, Datasearch Consultants, Bank Towers Bldg., Wyoming Ave., and Spruce St., Scranton, Pa. 18503.

FLORIDA OPPORTUNITIES

AMERICAN BANKERS
INSURANCE GROUP

MIS PROFESSIONALS

We are seeking E D P professionals with experience under DOS or OS in an insurance environment The systems in use are twin IBM 370/148's operating under DOS.

CFO II or ISSUE-COMM, heavy assembler language and Modular Programming within the Life Insurance Industry is mandatory.

This opportunity is available with one of America's fastest growing insurance groups Forward your resume including salary history or call

R.M. Reynard
AMERICAN BANKERS
INSURANCE GROUP
Human Resources Dept.
600 Bricknell Ave.
Miami, Florida 33131
592-1100, Extension =4665

An Equal Opportunity Employer M/F

PROGRAMMER/ANALYSTS

Put a Barnett Career In Your Future Today!

Barnett Computing Company provides quality data processing services for the highly respected Barnett Banks of Florida. The challenges of maintaining exacting standards in a fast-paced, growth environment are met daily by a top-notch staff of EDP professionals You owe it to yourself to consider the career significance of joining our team.

Several new opportunities are now available within our Systems Management Division Current needs are in the areas of Deposits, Commercial Loans, Trust, General Ledger and Credit Cards. We will require at least 1-1/2 years experience on large scale IBM systems and a thorough knowledge of COBOL and OS JCL. Banking or financial systems experinece is highly beneficial.

We offer excellent incomes, commensurate with expertise, plus a generous benefits package For immediate, confidential consideration call Carey Kilgore at (904) 731-6146 or send your resume to Barnett Computing Company, Systems Management Division, P O. Box 10068. Jacksonville, FL 32207

Barnett Bank

Barnett Computing Company

A subsidiary of Barnett Banks of Florida, Inc.
An Equal Opportunity Employer, M F

BANK CARD ADMINISTRATOR

Major holding company presently has an opening for a Bank Card Administrator requiring at least 5 years solid bank operations experience with a minimum of 2 years experience in either a programming or systems environment. Technical knowledge of the installation requirements of ATM's and the ability to communicate effectively at every level are essential.

Now is the time to make your career change with our aggressive, rapidly expanding organization that has over 1.7 billion in assets. Flagship offers an attractive starting salary, paid relocation, an outstanding benefit program and a year-round summer climate. Don't let this unique opportunity pass you by. Please send confidential resume and salary requirements to K. Alvarez, Personnel Administrator.

FLAGSHIP SERVICES
CORPORATION
5401 W. Kennedy Blvd.
Suite 220
Tampa, FL 33607

An equal opportunity employer, m/f

FLORIDA

RPGII/CCP PROG/ANAL TO 25K

Due to expansion, our client, the So Fla headqtrs of a software facilities development co. is actively seeking an individual with strong RPGII/CCP experience. (Background w/hospital systems a plus.) This situation is a ground-floor opportunity, for the right person. Work environment includes dual S/3 15D's. If you have a desire to work in a really sharp shop, and be in the forefront of technical developments, I want to hear from you. For immediate attention & results, contact Len Payden, Division Manager.

HAYDEN-MITCHELL ASSOC.
EDP Division
2626 Oakland Park Blvd.
Suite 213
Ft. Lauderdale, FL 33311
(305) 735-1015
Mon.-Fri. 9-5
SERVICE CHARGE ASSUMED
BY CLIENT COMPANY

COLD 'NUFF YET?

These positions are open
NOW!!

P/A - NCR - Cobol - NEAT	3$16K
P/A - IBM - OS/Cobol-Loans	$16K
P/A - Burr-Item Proc	$15K
P/A-HW-Cobol-OS or GCOS	$19K
P/S - Banking - Any hdwe	$18K
P/A - DOS/VS - Mfg - CICS	$18K
Sys Prog - DOS/VS - NCP	$20K
Anal - Heavy mfg exp	$19K
P/A - RSX11 - Graphics	$22K
P/A - Bnkg - NCR - CIF	$18K
P/A - OS/VS - IMS	$22K
DBA - OS/VS - IMS	$24K
Tech Writer - Any hdwe	$19K
Hdwe Anal - 370/OS - CMS	$22K
Anal - OS - DB/DC	$22K
Anal - Order Entry	$18K
Sys Prog - JES2 - Intern	$23K

Many others to choose from. Mail resume to Stan Allen

ROBERT HALF
OF TAMPA, INC.

1311 N. Westshore Blvd.
Tampa, FL 33607
(813) 876-4191

---

when your career is in the balance...

SYSTEMS ENGINEERING LABORATORIES IN FLORIDA OUTWEIGHS ALL THE OTHERS!

Systems Engineering Laboratories is seeking professionals who are enthusiastic, hard working, and committed to their field of expertise. We are an innovative, growth-oriented leader in the field of 32-bit mini-computers and a pacesetter in providing career advancement to creative dedicated professionals. We can offer you an opportunity to enhance your expertise with excellent growth potential and personal satisfaction while rewarding your contributions with excellent salaries and a full-range benefits package.

SOFTWARE ENGINEERS

Opportunities to contribute individually and in small groups, working on compilers, run-time systems, file systems and major operating systems development. Successful candidates will interact with hardware engineering, advanced systems, logistics and documentation groups. Experience required in ASSEMBLER language and one or more higher level languages, with 1-5 years background in operating systems development. A degree in computer science is preferred.

SOFTWARE PROGRAMMERS

Software project implementation of power plant monitor computer systems. Position involves software systems and applications programming. Fluency in assembly language and experience in real-time data acquisition programming is required.

SOFTWARE AND HARDWARE TECHNICAL TRAINING INSTRUCTORS

Software: Experience in teaching software courses in ASSEMBLY and FORTRAN languages preferably in a real-time environment.
Hardware: Experience in teaching microprocessor based computer systems.

MICROPROGRAMMERS

Work involves developmental firmware design for advanced development group Minimum of 2 years experience as microcoder and a desire to grow within a dynamic group.

HARDWARE LOGIC DESIGNERS

Responsible for systems and logic design for computer systems. Logic design experience is required and some microprogramming experience is desired. Must be capable of doing cost estimating in support of bidding new job opportunities.

DIAGNOSTICS PROGRAMMERS

Experience required in hardware diagnostics for computer vendor.

MANAGER OF CONTRACTS ADMINISTRATION

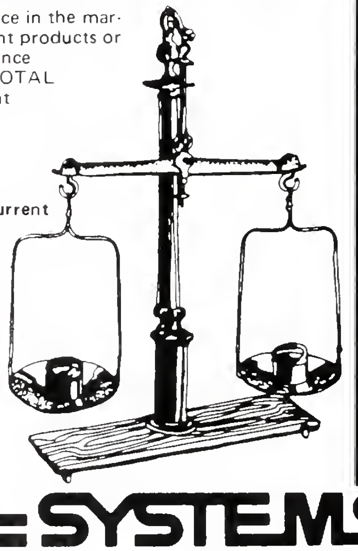
Expereince in drafting, enforcing and administering fixed price government and industrial contracts. Must have knowledge of ASPR with background essential in either legal, business or engineering areas. Some travel required

MARKETING PRODUCT MANAGERS APPLICATIONS SOFTWARE

Requires 2 years experience in marketing of applications software packages. An MBA degree is highly desirable, as is experience in the area of manufacturing systems, mechanical engineering programs, discreet or continuous simulation and project management software.

MARKETING PRODUCT MANAGER, DATA MANAGEMENT SYSTEMS

Requires 2 years experience in the marketing of data management products or services. One year experience in the use of MARK IV TOTAL System 2000 or equivalent is highly desirable.



FOR CONFIDENTIAL CONSIDERATION,
send your resume, with current salary, to Fred Brillante, Dept. CW1127.

SYSTEMS
ENGINEERING LABORATORIES

6901 W. Sunrise Blvd., Ft. Lauderdale, FL 33313

We Are An Equal Opportunity Employer M/F

Florida Opportunities

ALL AT ONCE IT'S HARRIS!

The Computer Systems Division of Harris Corporation is perhaps the fastest growing division within our Fortune 500 company. New Divisional headquarters are in the process of being completed in the highly desirable Ft. Lauderdale location.

SENIOR SOFTWARE ENGINEERS

Experience with a computer manufacturer in software systems design and development plus M.S. in Computer Science or equivalent. Knowledge of design integrity, quality control and project management functions of the software development process.

SOFTWARE ENGINEERS

Systems software development. Requires a B.S., preferably an M.S., in Computer Science, Math or Engineering with systems programming and/or microprocessor experience.

Please send resume and salary history in strict confidence and or call: Toll free (800) 327-4989

Mr. Robert Coyner
Manager Professional Staffing
Harris Computer Systems Division
2101 Cypress Creek Rd.
Fort Lauderdale, Florida 33309

An Equal Opportunity Employer M/F

HARRIS
COMPUTER SYSTEMS
A DIVISION OF HARRIS [illegible]

SOFTWARE ANALYSTS

Florida Positions

The RCA missile Text Project located at Cape Canaveral on the east central Florida coast has openings for qualified professional Programmer/Analyst and Programmer Trainees to support its requirements on the Air Force Eastern Test Range.

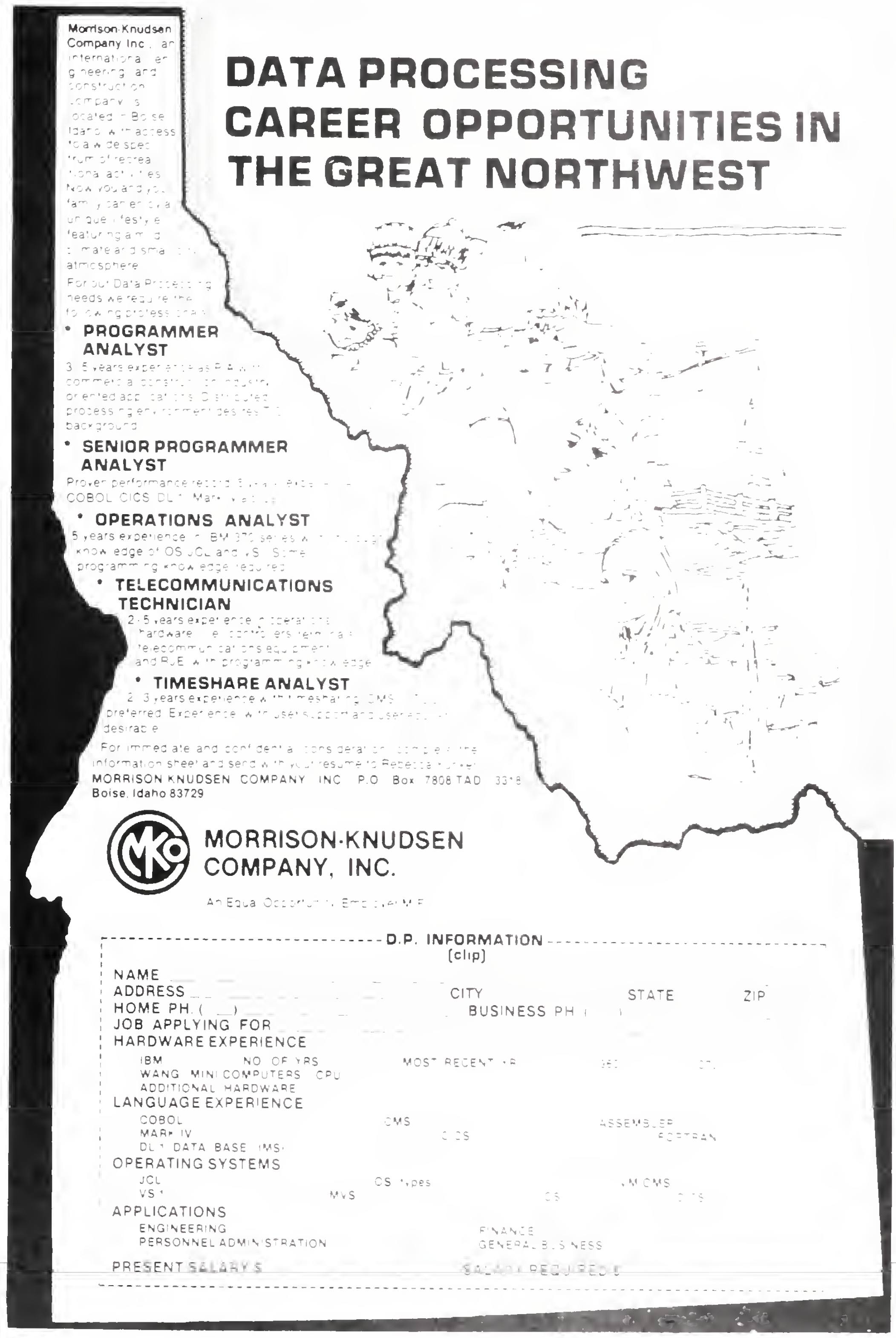
A technical bachelor's degree or the equivalent experience is required. We are strongly interested in individuals with experience in Real-Time applications employing FORTRAN or ASSEMBLY language, and with experience in programming for CDC CYBER 74, CDC-MP60, MODCOMP or DEC computers.

If you qualify and are interested, please send resume in confidence to:

Employment Manager
RCA Missile Text Project
P.O. 4308
Patrick, AFB, FL. 32925

We are an equal opportunity employer M/M/V/H

RCA



DATA PROCESSING CAREER OPPORTUNITIES IN THE GREAT NORTHWEST

Morrison-Knudsen Company Inc., an international engineering and construction company, is located in Boise, Idaho with access to a wide spectrum of recreational activities. Now you and your family can enjoy a unique lifestyle featuring a mild climate and small [illegible] atmosphere.

For our Data Processing needs we require the following professionals:

- **PROGRAMMER ANALYST**
  3-5 years experience as P/A with commercial, construction, industry oriented applications. Distributed processing environment desired [illegible] background.
- **SENIOR PROGRAMMER ANALYST**
  Proven performance record 5 years experience [illegible] COBOL, CICS, DL/1, Mark IV [illegible]
- **OPERATIONS ANALYST**
  5 years experience in IBM 370 series with [illegible] knowledge of OS JCL and VS. Some programming knowledge required.
- **TELECOMMUNICATIONS TECHNICIAN**
  2-5 years experience in operating hardware [illegible] controllers, terminals, telecommunications equipment and RJE with programming knowledge.
- **TIMESHARE ANALYST**
  2-3 years experience with timesharing CMS [illegible] preferred. Experience with user support and user [illegible] desirable.

For immediate and confidential consideration, complete the information sheet and send with your resume to Rebecca [illegible]

MORRISON-KNUDSEN COMPANY, INC. P.O. Box 7808 TAD 3318
Boise, Idaho 83729

MORRISON-KNUDSEN COMPANY, INC.

An Equal Opportunity Employer M/F

D.P. INFORMATION
(clip)

NAME
ADDRESS CITY STATE ZIP
HOME PH. ( ) BUSINESS PH. ( )
JOB APPLYING FOR
HARDWARE EXPERIENCE
IBM NO. OF YRS MOST RECENT YR [illegible] [illegible]
WANG MINI COMPUTERS CPU
ADDITIONAL HARDWARE
LANGUAGE EXPERIENCE
COBOL CMS ASSEMBLER
MARK IV CICS FORTRAN
DL/1 DATA BASE (IMS)
OPERATING SYSTEMS
JCL OS types VM/CMS
VS1 MVS DOS [illegible]
APPLICATIONS
ENGINEERING FINANCE
PERSONNEL ADMINISTRATION GENERAL BUSINESS
PRESENT SALARY $ SALARY REQUIRED $

AT CRAY RESEARCH...

We're Building For the Future

CRAY RESEARCH [illegible] growing company [illegible] atmosphere.

CUSTOMER ENGINEER:

Several years experience [illegible] necessary. After several months training on the Super Scal [illegible] CRAY [illegible] be assigned to a customer site.

SR. TECHNICAL WRITER:

This position requires [illegible] our hardware or software [illegible] customer [illegible] required.

This individual should have [illegible] experience as a writer [illegible] with a good background in [illegible] hardware [illegible]

In addition to an attractive compensation [illegible] highly successful and growing organization. Please submit resume [illegible]

[illegible]
CRAY RESEARCH INC
[illegible]
[illegible]

[illegible]

CRAY RESEARCH, INC.

SYSTEMS PROGRAMMERS

Here is your chance to take advantage of a full range of exciting opportunities that currently exist at the First National Bank of Boston for experienced IBM OS/VS Systems Programmers and Assembler Programmers. While providing quality systems software support to our Data Center and User community, you will be working with MVS 3.7, JES2, making extensive use of TSO on IBM 3032, 3350 and 3800 hardware.

The individuals we are seeking should have several years of OS and BAL experience and the ability to develop and present creative solutions to technical problems. On line experience would be a plus, as we are consolidating our 3 major networks using the INTERCOM teleprocessing monitor.

The First National Bank of Boston offers a flexible working environment combined with an excellent salary and benefits to provide you with considerable latitude for personal and professional growth. If you are interested in utilizing your skills with a challenging and rewarding environment of one of the leading financial institutions in the Boston area, please forward your resume, including salary history, in confidence, to J.S. Allschwang, The First National Bank of Boston, P.O. Box 1976, Boston, MA 02105

THE FIRST NATIONAL BANK OF BOSTON

An equal opportunity employer m/f

COMPUTER SOFTWARE CUSTOMER SUPPORT

Our company, a leader in the proprietary software market, has expanded its customer base at a record-setting pace and needs to add to its Client Services staff. Responsibilities would include training and working with new and existing clients as well as involvement in sales support activities.

IF YOU:

- Have a college degree
- Have a minimum of 3 years systems design and programming experience in COBOL, FORTRAN or Assembler (IBM environment)
- Have OS or DOS JCL knowledge
- Have exposure to Data Base Systems (IMS, TOTAL)
- Are an ambitious, self-starting individual who would enjoy considerable travel
- Have experience or aptitude in training procedures

WE OFFER:

- Excellent compensation plus expenses and exceptional benefits
- A professional atmosphere with an emphasis on personal growth
- Intensive in-house training
- Opportunity for rapid advancement

Send resume including salary history and requirements to

John E. Skrypa
Group Leader, Client Services

Program Products Incorporated
95 Chestnut Ridge Road
Montvale New Jersey 07645

An equal opportunity employer M/F/H

OPPORTUNITIES FOR PROGRAMMER ANALYSTS IN PHOENIX

To meet the challenges presented by a growing organization, our Management Information Systems Group is searching for quality systems professionals to become part of our Corporate Headquarters staff. You will have an opportunity to test your skills in a state of the art environment that encourages creativity and initiative.

The opportunities we're talking about require heavy experience with large scale IBM equipment (converting to 3033) using COBOL in an OS MVS environment. Experience with on-line systems and TOTAL DBMS would be a definite advantage. Heavy user interface makes excellent communications skills necessary.

If this sounds like the opportunity you've been looking for and are interested in relocating to an area noted for its casual, friendly lifestyle and attractive climate, send us your resume. Tell us what you've done, your career goals and salary requirements.

John Marques, Jr.
111 W. Clarendon
Phoenix, Arizona 85077

ARMOUR AND COMPANY

An equal opportunity employer M/F

North Carolina PROGRAMMER/ANALYST

Midpoint $22,000 **Fee Paid**

Needed Cobol programmer/analyst. Project management a plus. ROSCOE a plus. 2 to 3 yrs. experience programming. This position is with a leading bank. Environment: 370/158, OS/VS1, CICS.

We currently have several hundred openings for Cobol programmers & analysts in the Southeast.

Call or send resume to:
Chip or Loyd
D.P. Department
PERSONNEL PLACEMENT
537-D Huffman Mill Rd.
Burlington, NC 27215
(919) 584-5591

TELE COMMUNICATIONS SPECIALISTS

Proj. Mgr.-N.J. **to $40K**
EE-manage communications projects

T/C Proj. Mgr.-Conn. **to $31K**
EE degree, Heavy telephony

Sr.T/C Conslt-Conn. **to $32K**
Heavy Voice-10 year projection

T/C Conslt-NYC **to $25K**
Voice, Dimension Telephone

T/C Analyst-NYC **to $22K**
TCAM/BTAM

Fees assumed by client co's.

LESLIE. KAVANAGH
505 5th Av NY, NY 10017
(212) 661 0670 (agency)

SYSTEMS PROGRAMMER/ANALYST

An Arby's Franchise operator with over 50 restaurants in Grand Blanc, Michigan is looking for a Systems Programmer Analyst to help in the development of a business management system on a Honeywell Level 62. The candidate should have 1-3 years experience in an IBM System 3-8. Honeywell 62 or larger installation RPG II experience required with COBOL and communications experience a strong plus. Send resume and salary history to:

SYBRA, INC.
P.O. Box 7
Grand Blanc, MI 48439

An Equal Opportunity Employer

Operations Manager

$1848 - $2231/mo

Ground floor opportunity in hospital distributed minicomputer systems group. Innovative on-line hospital administration and clinical support systems utilizing intelligent terminals and dual 96KW Data General minicomputers. Additional minicomputers anticipated. Networking of minicomputers needed. On-line systems operations experience required. High-level programming language experience desired.

Please call 666-2230 or send resume to Dr. D. Simborg, University of California, Room M119, 505 Parnassus Ave., San Francisco, CA 94143.

UCSF

Equal Opportunity Affirmative Action Employer

Find Yourself, a job in the classified pages of Computerworld.

COMPUTERWORLD

Another Breen New England Data Processing EXCLUSIVE

The positions listed below represent two major clients, a 370/168 MVS center and a 370/155 OS/VS 1 environment. Data Centers converting to 3031 and 3033 systems.

Manager of Systems Support, TOTAL, CICS	to $38K
Senior Technical Programmer, BAL, IMS,	to $28K
Senior Systems Designer, business applications	to $27K
Senior Programmer Analysts, COBOL, OS, CICS	to $25K
Programmer Analysts, COBOL, train IMS	to $23K

Salaries commensurate with experience. Relocation and travel expenses paid. Respond in confidence to Toby S. Brimberg.

3780 Whitney Ave.
Hamden, Ct. 06518
(203) 288-7461

Call, clip coupon,
or send your
resume in confidence.

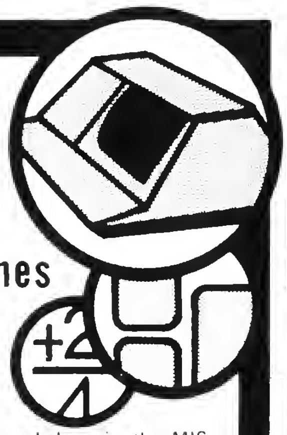
BREEN DATA Division of the Breen Group, Inc

Name ______
Address ______
City ______ State ______ Zip ______
Employer ______ Title ______
Position description ______
Telephone ( ) ______ Present salary ______

---

programmers

ARE YOU...



( ) behind the times
( ) catching up
( ) into tomorrow

If you've checked box three, you belong in the MIS Department at the Hammermill Paper Company. Here you'll find an environment that may even be a step ahead of tomorrow.

We're moving now into the 3031 generation - an event that provides exceptional opportunities for you to extend your reach, imagination and technical scope.

The following newly created openings require strong financial applications background in a manufacturing environment using ANS, COBOL on IBM 370 OS/VS running IMS. Degree in Math, Business or Engineering essential. MBA desirable.

PROJECT LEADERS

Should be shirt-sleeves lead analyst with desire to move ahead on the strength of your data-base IMS experience.

SR. APPLICATIONS PROGRAMMER

Needs full project applications experience with technical competence for program design, coding, testing on accounting/financial applications.

Both corporate-headquarters positions are located in a pleasant, progressive city that is the center of popular year-round recreational area. It offers excellent living opportunities at costs modest in comparison to most metropolitan areas.

Salaries are excellent, commensurate with experience. And complete benefits package includes fully paid relocation. Send resume in confidence to: J.L. Heimbold, Manager, Corporate Recruiting

HAMMERMILL PAPERS

HAMMERMILL PAPER COMPANY

Box 1440, Erie, Pennsylvania 16553
An equal opportunity employer M/F

MOVING?

Please notify *Computerworld* at least four weeks in advance. When writing about your subscription, please enclose a recent mailing label. The code line on top may not mean much to you, but it is the only way we have of quickly identifying your records. If you are receiving duplicate copies, please send both labels.

797 Washington Street
Newton, Massachusetts 02160

SYSTEMS PROGRAMMER

Bachelor's in Computer Science and three (3) years of progressively responsible business computer programming experience, one (1) year of which has involved generation of high-level operating systems; OR High School graduation and five (5) years of progressively responsible experience as above, three (3) years of which have involved generation of high-level operating systems.

Send letter of application and resume to Susan M. Bondy, Personnel Bureau, room 103A, 30 Church St., Rochester, New York, 14614.

An Equal Opportunity/Affirmative Action Employer M/F

CITY OF ROCHESTER.
NEW YORK 14614

Position Wanted

POSITION WANTED

Programmer/Analyst with 5 years experience in banking, insurance and distribution business systems seeks a new position in New Jersey. Well-conversant with COBOL, BAL, PL/1 and JCL languages. Experience includes Amdahl 460/V6, IBM 370/168 and 3032 machines, MVS operating system, TSO/SPF, Panvalet, Improved Programming Technique. Presently employed by a big bank in Montreal, Canada and on the waiting list of U.S. immigration visa. Interested party please write to:

CW Box 1758
797 Washington St.
Newton, MA 02160

DATA PROCESSING

Systems Analysts, Programmers and Engineers

The big move is to NCR

Take the first step to a more exciting career, where Engineers/Programmers are seen, heard, and recognized.

Ground-floor opportunities exist in the design and development of our new C-2140 multi-microprocessor retail system for lodging, general merchandise, restaurant, grocery and fast food industries at our Engineering and Manufacturing Division in Millsboro, Delaware. We are at the forefront in the design and manufacture of ECR/POS intelligent terminals—NCR is extending the state-of-the-art to its limits.

Investigate these opportunities:

SYSTEMS ANALYSTS

- Operating Systems (OS) Design
- Microprocessor Software
- SDLC Communication Protocols

REAL-TIME PROGRAMMERS

- Assembly Language
- I/O Drivers
- Diagnostics
- PDP 11/40 & PDP/70

SYSTEMS ENGINEERS

- Multi-Microprocessor Systems
- Distributed Processing
- SDLC Communication Networks

DEVELOPMENT ENGINEERS

- 8080 Based Microprocessor Design
- NMOS, EMOS, CMOS, LSI & MSI Technologies
- Multiprocessor Systems Architecture

■ ■ ■

[illegible] have [illegible] qualifications [illegible] talking to you.

We have [illegible] Land of Pleasant Living [illegible] presses, and the nation's finest beaches. We are within a 3-hour drive of such major cities as Philadelphia, Baltimore and Washington.

Come to where the challenge is.

•

Call Joe Buskirk COLLECT at (302) 934-8111 9:00 a.m. to 4:00 p.m. daily.

Or send your resume to him at:
NCR Corporation,
Engineering and Manufacturing Division/Millsboro,
Dept. P50
Mitchell Road, Millsboro, DE 19966.

NCR

An equal opportunity employer

Systems Programmer

If you're a good systems programmer, take time to explore this growth opportunity with Signetics, the Good People Company. Because we're good, we've enjoyed several years of steady growth -- and we're a recognized leader in the design, manufacture and sales of integrated circuits.

We are currently seeking a systems programmer to help us install our new IBM 3033. Our large VM/370 computer shop needs 370 internals people with experience in large scale OS or VM shops. Computer usage includes large TP network, engineering simulation, distributed processing and process data collection.

If you possess a BS in Computer Science, and have 5-10 years of related experience, we'd like to talk with you.

Please send your resume in confidence to Signetics, Job 9003, 811 East Arques Avenue, Sunnyvale, CA 94086. We are an equal opportunity employer m/f.

The Good People Company.

signetics

a subsidiary of U.S. Philips Corporation

POSITIONS NATIONWIDE

CALL TOLL FREE
800-426-0342

T.P. PROGS To 24M
CICS/VS experience required.
COBOL PROGS To 23M
OS exper. in any industry.
SYSTEMS PROGS To 30M
IBM, CDC or Honeywell.
DATA BASE ADMIN'STo 28M
Four + yrs exp. in D.B. required.
PROD. MRKT SPEC. To 37M
B.S. Chem. E. + Process Control exp.

BILL ISGRIG
PARKER PAGE ASSOC.
P.O. Box 12308
Seattle, WA 98111
Offices in Wash., D.C.,
Chicago, Atlanta, Portland, Or.

*** GENERALIST ***

We are an unconventional and rapidly growing consulting firm in the San Francisco area whose commitment to quality and craftsmanship is paramount. We need an unusually competent problem solver with broad technical experience who can adapt quickly to a variety of computer environments and applications.

You will have the opportunity to work directly with clients; configure hardware; design, develop, and implement software and procedures; and provide direction for talented but less experienced coworkers. Online design experience and knowledge of COBOL are required; other languages (e.g. Basic, Fortran, PL/I, BAL) are highly desireable. **Contact PBL Associates, 10 Cottage Ave., Point Richmond, Calif. 94801 (415) 234-4338**

---

programmers

TIRED OF CODING?

INSTRUCTORS NEEDED

If you are interested in putting your technical expertise and background to use in working with people as well as computers, then this is your opportunity to inquire about joining our in-house training staff.

We are looking for DP professionals who have the capability to provide the technical instruction to support our programming and operations staff in an IBM 370 MVS/COBOL environment. With the proper background we will assign you immediately to responsibilities as a Course Developer, Lecturer, Workshop Leader or Tutor. You will also be trained in all of the latest DP technologies (a benefit most programmers don't receive.)

To qualify, you will need excellent inter-personal and communications skills and a solid background in COBOL and JCL/Utilities. Experience in the following areas would be beneficial: TSO, VSAM, IMS, ALC, Mark IV or Top-Down Design/Structured Programming.

Prior teaching experience is preferred but not mandatory.

In return for your technical know-how, we offer an excellent package of compensation that includes top benefits and exciting potential for growth. For confidential consideration, please send resume and salary history to:

CW Box 1776
747 Washington St.
Newton, MA 02160

An Equal Opportunity Employer M/F

DATA PROCESSING MANAGER

THE OPPORTUNITY

To assume immediate responsibility for directing the activities of an aggressive, nine-person DP team.

THE COMPANY

JLG Industries, Inc., leading manufacturer of hydraulic mobile aerial working platforms and industrial cranes. The company is also public trading OTC.

THE LOCATION

Small town suburban south central Pennsylvania area within 45 minutes drive from Hagerstown, MD.

THE POSITION REQUIREMENTS

Experience in using IBM System 3/15D equipment with disk input and storage. Working knowledge of RPG-II required; FORTRAN would be a plus. Data collection through on-line terminals desirable.

Experience in using IBM System 3/15D equipment with disk input and storage. Working knowledge of RPG-II and CCP required; working knowledge of FORTRAN 4 and IBM's IPICS software a plus. Experience with data collection devices and IBM System 34 are also a plus.

THE ''PLUS'' FACTORS

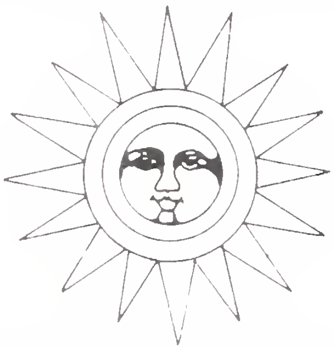
New, modern equipment and facilities.
Liberal, extensive employee benefits package.
Excellent long range growth potential.

Qualified applicants are requested to submit complete resume of training and experience background, including current financial requirements, to. Sam Swope, Personnel Department.

JLG INDUSTRIES, INC.
JLG Drive
McConnellsburg, PA 17233

An Equal Opportunity Employer M/F

SUN BELT OPPORTUNITY



Are you tired of the cold winters and the same old software problems?

Want a change for the better?

Join a new life insurance management company in Atlanta and get in on the ground floor for the opportunity of a lifetime. Presently we provide data processing services to several large life insurance companies, and we are seeking aggressive self-starters to join a dynamic team of DP professionals dedicated to providing high quality DP services

Be in on the beginning of network teleprocessing, large DB/DC applications, major hardware upgrades, expanded timesharing applications, new software and large insurance systems.

We will be conducting interviews for experienced project managers, programmer/analysts, analysts, programmers, technical support personnel and operations managers with a life insurance background.

Interviews will be conducted

Hartford, Connecticut on December 9 & 10, 1978
Philadelphia, Pennsylvania on December 9 & 10, 1978
Jacksonville, Florida on December 9 & 10, 1978

For further information and to schedule a personal interview, call Carole Oliver COLLECT at 404/524-6666. OR send your resume to

SUN INSURANCE SERVICES, INC.

P.O. Box 56563
Atlanta, Georgia 30343
Equal Opportunity Employer M/F

SYSTEMS SUPPORT ANALYSTS/ PROGRAMMERS

EXPAND YOUR HORIZONS IN THE WEST WITH SPERRY UNIVAC

Advance your career in a state-of-the-art environment! Sperry UNIVAC, long recognized as an innovative leader in the computer industry, is looking for Analyst/Programmers for Marketing Support positions in:

LOS ANGELES
SAN FRANCISCO
SACRAMENTO
DENVER

We are interested in talking with Analysts who have experience in any of the following areas:

- Large or small scale operating systems
- Date Base Programming and Systems Design
- Virtual Memory programming
- Communications
- Working knowledge of COBOL and/or FORTRAN
- Knowledge of the UNIVAC 90 or 1100 Series would be a plus

Sperry UNIVAC offers an exceptional salary and benefits package, including a free dental plan and an outstanding Employee Stock Purchase Plan.

Ours is a swiftly moving company offering significant reward and advancement to the individuals who can match our pace. If you feel you are qualified, please send your resume including salary history and geographical preference, to:

L.E. WILLEFORD

SPERRY UNIVAC

MINI-COMPUTER OPERATIONS

10880 Wilshire Blvd., Suite 2110
Los Angeles, CA 90024

Equal Opportunity Employer M/F

"THE RECRUITING FIRM FOR THE COMPUTER PROFESSIONAL"

Massachusetts and New Hampshire Locations

- EFTS/RSX 11
- SYSTEMS ENGINEERING
- OPERATING SYSTEMS DEVELOPMENT
- NETWORK DEVELOPMENT
- BIOMEDICAL DEVELOPMENT
- DATA BASE DEVELOPMENT
- VAX/TRAX SOFTWARE
- MICRO LANGUAGE DEVELOPMENT
- CAD/CAM
- MANUFACTURING APPLICATIONS
- SCIENTIFIC PROGRAMMING
- POS/CREDIT AUTHORIZATION
- MARKETING SUPPORT
- COBOL PROGRAMMER/ANALYST

Salaries range $20-45,000 for technical contributors to senior management.
Call collect (617) 273-1740.

MAS *Management Advisory Services Inc.*
MANAGEMENT CONSULTANTS
16 New England Executive Park, Burlington, Mass. 01803

Clients assume all fees and relocation
We are management consultants representing equal opportunity employers.

COMPUTER PROFESSIONALS

Control Data Corporation has career growth opportunities in pre-sale, post-sale and consulting located throughout the United States.

APPLICATIONS

Applicants should have experience in one of the following areas

- PROGRAMMER/DESIGN ANALYSTS

(Opportunities in Chicago, Los Angeles, Milwaukee, Minneapolis, Pittsburgh, Portland, St. Louis, San Francisco Bay Area, and Washington, D.C.)

COBOL, FORTRAN, BASIC
Interactive Information Systems
Quantitative Analysis
CDC 6600/7600, CYBER 70 or 170 series
IBM 370/360 OS, VS

- DATA BASE ANALYSTS

(Opportunities in Los Angeles, Minneapolis, Philadelphia, St. Louis, San Francisco Bay Area, and Washington, D.C.)

COBOL, FORTRAN
Total System 2000 IMS SPSS

- SOFTWARE DEVELOPMENT

(Opportunities in Detroit, Los Angeles, Minneapolis, New York City, San Francisco Bay Area and Washington, D.C.)

Requirements Analysis
General and Detailed Design
Systems Analysis
Project Leadership
Information Systems Implementation
Knowledge of Time Sharing Usage

- ELECTRIC UTILITY ENGINEERS

(Opportunities in East Coast, Midwest, and West Coast cities.)

- Distribution and/or Transmission
- Load Flow, Transient Stability, Economic Dispatch or Short Circuit Analysis
- Heating, Air Conditioning and Ventilation
- Minicomputer operating system experience

OPERATING SYSTEMS

Applicants should [illegible] modifying or extending [illegible] operating systems

- CYBER 17X, 6000 or other large systems with NOS, NOS/BE, SCOPE, KRONOS, or OS

(Opportunities in Boston, Chicago, Cleveland, Coco Beach, FL, Dayton, Detroit, Livermore, Calif., Los Angeles, Minneapolis, New Jersey, Philadelphia, Seattle, St. Louis, San Francisco Bay Area, Tulsa, OK, and Washington, D.C.)

- System 370, 360 or OMEGA with DOS, VSI, VSII, SVS or MVS

(Opportunities in Cleveland, Detroit, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York City, and St. Louis)

- CYBER 18 or other minis with 1700 MSOS, RCOS, ITOS or OS

(Opportunities in Los Angeles, Minneapolis, New York City, San Antonio, San Francisco Bay Area and Washington D.C.)

- PDP-11 with RSX/11M

(Opportunities in Minneapolis, Sunnyvale, California, and Livermore, California UNIX Operating System background a plus for the opening in Livermore.)

or have extensive [illegible] above computers.

- ENTRY LEVEL CANDIDATES

If you have experience in any of the above areas, we have openings located throughout the U.S.

For immediate consideration, please send resume, salary history and geographical preference to John N. Powers at the address below.

CONTROL DATA CORPORATION

60 Hickory Dr., Waltham, Mass. 02154
OR CALL COLLECT:
(617) 890-4600, ext.245

An Affirmative Action Employer M/F

Systems Software Professionals

Expand your career horizons— with COMSHARE.

We've launched a new **Services Division** based on the latest systems technologies. A multi-phase program requires establishing a Data Center, and building an interactive software system based on IBM architecture. *Areas of responsibility include systems analysis, hardware/software evaluation and selection, installation planning, and implementation.* You should have

- 3 to 8 years' experience as a systems programmer in the internals of 1 or more IBM OS/VS operating systems. Experience should include installation, modification, and/or maintenance of system software
- *Familiarity with 1 or more of JES RJE interactive transaction processing, timesharing, or communications on large-scale IBM hardware*
- Ability to communicate clearly and work independently or as part of a team
- *A degree in a Computer Science related discipline, or equivalent experience/training*

COMSHARE, INC., is one of the fastest-growing, most profitable remote computing/timesharing services companies. We're located in Ann Arbor, Michigan—research center of the Midwest. These positions command excellent salaries and benefits.

For prompt consideration, please send your resume to **S.G. Govande, COMSHARE, INC., PO Box 1588, Ann Arbor, MI 48106.** We're an equal opportunity employer M/F

COMSHARE

COMPUTER SYSTEMS MANAGER

Salary open up to $29,268 per year, includes extensive benefit package. County of Orange, California seeks highly motivated individual to fill key management position in charge of computer division of Environmental Management Agency. Requires extensive experience with large scale multi-programmable computers, on-line data collection/retrieval techniques and experience as supervisor or manager of computer systems group. Thorough knowledge of project management techniques and computer applications to land planning and management, engineering and mapping. Apply immediately. No resumes.

COUNTY OF ORANGE PERSONNEL DEPT.

625 N. Ross St., Rm G180
Santa Ana, Calif. 92701
(714) 834-2884
Affirmative Action Employer

A classified section is known by the companies it keeps.

COMPUTERWORLD

Ready to Move Up?

SYCOR

THE INNOVATORS

In Distributed Data Processing Systems are looking for

MANAGER, SYSTEM LANGUAGES

This is your chance to take on a high-visibility challenge in microprocessor software development, including:

System Implementation Languages
Cross Assemblers
Debuggers
DBMS

To qualify for this position, you need to have demonstrated a high level of competence including:

- M.S. in Computer Science or equivalent
  Hands-on compiler construction
- Supervisory experience as project leader

We offer competitive salaries, complete benefits and an excellent opportunity for advancement. Please send your resume in confidence to MARION GRAHAM, Personnel Specialist.

SYCOR

P.O. Box D, 100 Phoenix Drive, Ann Arbor, Michigan 48106

Sycor puts computer power where the work is

Equal Opportunity Employer M/F

Data Base Manager

[illegible]

CF & I STEEL CORPORATION

P.O. Box 316
Pueblo, Colorado 81002
Equal Opportunity Employer M/F

H - 6080

On-the-spot offers for junior (1-2 yrs) and intermediate (3+) analysts with H-6000 or HIS Level 66 applications programmers with COBOL, GMAP or FORTRAN Exp. Progressive non defense systems group expanding it's suburban Northern Virginia office. Help a major user develop his State of The Art Interactive Honeywell Data base System. Advance into TP & Data Base Management Systems. GCOS, IDS or TDS/TPE helpful. Some Senior level reqs. exist. Salary Range from $15,000 to Mid Twentys. Brand new facility, free parking, health, dental, retirement and other benefits. We are really moving — are you ready to move? If so call us 703/356-1907 and evening till 9 PM or write Computer Science Div CYBERMETRICS CORP. PO Box 579, McLean VA 22101 E.E.O/M/F

BAL Programmer

Remain technically up-to-date while enjoying the casual life-style and dynamic growth of

ALASKA!

We are seeking an individual with 2-3 years experience as a programmer, proficient in Assembler Language Coding on IBM 370 system. Knowledge of MICR systems and banking or financial institution DP is highly desirable.

Send resume including salary history, in confidence, to V.F. Garvy, Personnel Director, Box 600, Anchorage, Alaska 99510. An equal opportunity employer, m/f.

NBA Bank of Alaska

LOOKING for a job in Juneau? Look here in Computerworld's classifieds.

People are important to us at HELIX TECHNOLOGY CORPORATION because their contributions are our gains. At HELIX we design and manufacture equipment for industrial, research, military, gas processing and electric utility markets.

Because we recognize our people as our most important asset, we offer them a stimulating environment that puts their career in the lead, excellent benefits including a company paid retirement and medical plan plus a three week paid vacation for our professional staff people.

Our company's position is soundly based on proprietary technology and broad-based know-how in gas processing and materials handling. HELIX has grown rapidly and today is uniquely positioned to share in the future of the nation's programs to produce and conserve energy, to protect the environment, and to maintain the country's defense.

If you want to work for a company where you are recognized as the most important asset . . . join HELIX TECHNOLOGY CORPORATION in one of the following positions.

PEOPLE ARE OUR MOST IMPORTANT ASSET

PROJECT MANAGER
Financial Systems

We are looking for a take-charge individual to manage the MIS financial group and oversee the maintenance of our financial systems applications. This individual will be responsible for the development of specifications relative to the maintenance and upgrading of the systems, including computer operation and technical support, and, when necessary, the development and implementation of new financial applications. A minimum of six years of EDP experience with two years of experience as a Project Leader or Project Manager of financial systems is required. A BS degree in a related field and systems experience in accounts payable, accounts receivable, general ledger and cost accounting with previous DEC hardware/software experience is preferred.

SENIOR PROGRAMMER ANALYSTS
Financial Systems

The individuals selected will maintain and modify applications of the MIS financial system and analyze user tasks as related to the MIS function. Additional duties will include the training and support of staff personnel as well as the development of new and the upgrading of current financial systems. A minimum of four years of EDP experience with several years of experience as a programmer analyst working with financial applications is required. A BS degree in a related field plus previous DEC hardware/software experience is preferred.

PROJECT MANAGER
Manufacturing Systems

The successful candidate will be responsible for the total development of a manufacturing control system. This will include staffing, evaluation of the appropriate data base software to support the system and the implementation of the system developed. A minimum of six years of EDP experience preferably at the Project Leader level is required. A familiarity with the development of functional, programming specifications and the development and monitoring of project plans would be desired. A BS degree in a related field with prior MRP applications and DEC hardware/software experience preferred.

SENIOR PROGRAMMER ANALYSTS
Manufacturing Systems

Working with the Project Manager, you will assist in the development of a manufacturing control system. The successful candidates will be involved in the design of a data base necessary to implement the system and the development of functional and programming specifications needed for the various modules of the system. A minimum of four years of EDP experience with several years of manufacturing systems experience is required. Prior experience developing and installing manufacturing systems using DEC hardware/software and a BS degree in a related field would be preferred.

If you are interested in these positions, please send your resume including salary history in confidence to Ms. Jackie Hall, HELIX TECHNOLOGY CORPORATION, Kelvin Park, 266 Second Avenue, Waltham, Massachusetts 02154. An Equal Opportunity Employer M/F

HELIX

---

10 SIMPLE STEPS TO CAREER ADVANCEMENT:

305-727-0660

For further details, please see our display ad on page 72

DBA SYSTEMS INC.
P.O. Drawer 550
Melbourne, Fl. 32901

DATA PROCESSING PROFESSORSHIP

Rank and Salary Open Doctorate or A B D required Established and growing undergraduate and MBA programs. Opportunity to live and work in peaceful Northwestern Pennsylvania. **Send vita to Dr. Woodrow W. Yeaney, Chairman, Department of Accounting and Finance, Clarion State College, Clarion, PA 16214.** Equal opportunity/affirmative action employer.

Data Processing Instructor/ Assistant Professor

Masters degree in business, computer science, or related area with specific graduate preparation in computer science and systems area, COBOL and RPG. Data Processing experience in business and teaching experience highly desirable. Will teach day and some evening courses. Applications must be received by December 10, 1978. Send to Professional Personnel Office, Jefferson Community College, P.O. Box 1036, Louisville, KY 40201. An Equal Opportunity Employer.

**Jefferson Community College
University of Kentucky
Community College System**

BURROUGHS B6800 SYSTEMS ANALYST

Must have experience with ALGOL, DMS 11. Desire GEMCOS and other Data-Comm experience. Excellent opportunity for the right person, with growth potential in a 2x2 B6800 environment. Send resume with salary required in first letter to

Employment Manager,
Memorial Hospital,
1901 Arlington St.,
Sarasota, FL

An equal opportunity employer

RSTS

- PROJECT LEADER
- PROGRAMMER/ANALYST
- ACCOUNT MANAGER

3 Positions are available for individuals with a minimum of 1 year RSTS, BASIC-PLUS Programming & Commercial Applications. $18K and up.

**COMMAND COMPUTER SERVICE
14402 Industry Circle
La Mirada, Ca. 90638
(714) 994-3241**

Software Engineers Domestic & Foreign Assignments

Ford Aerospace & Communications Corporation has immediate requirements, both domestic and foreign, for individuals to become involved in our fast-growing software systems development group.

FOR EUROPE

We are seeking intermediate level Software Engineers for 1 year (development) or 3 year (development and maintenance) tours. Experience required on PDP-11/70, RSX-11 D/M, Assembly language/FORTRAN, real-time. Field allowance/premiums. Desirable location.

FOR PALO ALTO, CALIFORNIA

We are seeking senior Software Systems Engineers with experience in system studies, proposals, architectural design.

We also have an opening for an Operating Systems Analyst to manage an IBM 370/138 facility. Would be responsible for operation of facility, maintenance and management of operating system, consulting on use of facility, and development of new applications using data base management techniques. Prefer an individual with knowledge of VM-CMS and also familiar with IBM 370/138 operations.

THESE ASSIGNMENTS REQUIRE CURRENT TOP SECRET CLEARANCE/EBI

Our systems include *20± PDP-11/70's networked; *15-30 intelligent terminals (microprocessors); (microprocessors; *array processors; *distributed data base management; *state-of-the-art data processing.

LOCAL ASSIGNMENTS ALSO AVAILABLE

Please call toll-free (800) 227-8433 or COLLECT (415) 494-7400, ext. 6601 weekdays...or you may send your resume with salary history, including educational history, experience in computer, operating system, programming languages and applications software to Professional Employment, Dept. PF113

Ford Aerospace & Communications Corporation

Western Development Laboratories Division
3939 Fabian Way, Palo Alto, California 94303

An Equal Opportunity Employer M/F.

SYSTEMS STRATEGIES, INC.

We are a rapidly growing consulting firm specializing in Real-Time Systems-Communications and Applications on various computers. We are looking for technically oriented people at all levels. Computer science degree, assembly language, systems programming are all pluses. Immediate opportunities require at least 2 years of assembly language experience.

In addition, because of our rapid growth a few unique and significant positions are available within the company. Responsibilities to include customer interface, proposal writing and project leadership. Positions require solid hardware, software, telecommunications, and systems skills.

Salary open, liberal benefits, bonuses. Call (212) 695-9202 or send resume to: Systems Strategies, Inc.

1250 Broadway New York, N.Y. 10001

An Equal Opportunity Employer M/F

SOFTWARE ENGINEERS

The Boeing Company in Seattle, Washington offers a variety of challenging software engineering career opportunities in support of a wide range of projects including:

Energy Management/Control Systems
Military Command/Control Systems
Military & Space Avionics Systems
Surface Transportation Systems

We'd like to hear from you if you have U.S. citizenship, an appropriate technical degree, and an interest in the following:

OPERATIONAL SOFTWARE DEVELOPMENT

Design and develop software for simulators, operational systems, automatic test equipment and other special-purpose or realtime applications.

SOFTWARE/COMPUTING SYSTEM DESIGN AND ANALYSIS

Analyze system hardware, software and operator requirements to support establishment of a system architecture. Perform systems analyses and trade studies to support design concepts, new business acquisition and proposal activities.

SOFTWARE AND COMPUTER SYSTEM TEST AND EVALUATION

Design and develop hardware and software test concepts and environments to support operational software and computer systems test. Conduct software tests.

You won't find a better opportunity to combine a challenging career with the relaxed life-styles, abundant recreational opportunities, and rich cultural activities of the unspoiled Pacific Northwest.

Send your résumé to The Boeing Company, P.O. Box 3707-LQZ, Seattle, WA 98124

An equal opportunity employer.

BOEING

Getting people together

• Senior Systems Analyst • Programmer Analyst

Create complex systems that meet the engineering needs of the future at B & W

Optimize your potential while working within a major corporation committed to optimizing the effectiveness of its extensive EDP services. Primary objective will be to evaluate and design computer systems that fulfill our present and future technical and engineering requirements. Ideal candidates will have a degree in either Computer Science, Operations Research, Business Administration, or Industrial Management, as well as knowledge of state of art DP techniques.

SENIOR SYSTEMS ANALYST

Requires 5 years of computer systems project experience, in which you've demonstrated the ability to supervise a project team, write specifications, interface with users, and make formal presentations to management. Applications experience in Project Control/Project Management Systems also necessary. CPM/PERT, data base, and on-line experience desired.

PROGRAMMER ANALYST

Requires at least 3 years of heavy experience with some high level language, i.e. COBOL, PL/I, FORTRAN and large computers. Experience with structured programming, on-line systems, PERT CPM or other scheduling systems desired.

We offer fully commensurate salaries and fine benefits. Our facility is located in [illegible] vigorous community that will satisfy the varied recreational and educational needs [illegible]. Send resume and salary history to: Mr. G. Bunch, REF 317, P.O. Box [illegible] 24505.

Babcock & Wilcox
Power Generation Group

An equal opportunity employer, m/f

THIS SPACE FOR HIRE.

(Inquire at Classified Advertising Department)

COMPUTERWORLD

MARYLAND SOUTHERN PENNA

Dir, MIS	$28-32,000
Mgr Dist Proc	$28-30,000
Sr Systems	To $25,000
Soft Prog (2)	To $25,000
Sr Prog Analyst(3)	To $25,000

We are recruiting for major corps in Maryland & Southern Penna. Clients seek exper w/large scale IBM OS w/programming exper in COBOL. Bkgd in mfg, banking or insurance approp Relocation & all fees paid by client cos. Contact in conf Pon Nelson, 301-296-4500

FOX-MORRIS
Personnel Consultants
409 Washington Avenue
Baltimore, MD 21204
EDP SPECIALISTS

THE SEARCH IS ON AT HONEYWELL'S LOS ANGELES DEVELOPMENT CENTER FOR

SYSTEMS PROGRAMMERS

OPPORTUNITIES EXIST IN:

- DESIGN
- IMPLEMENTATION
- TESTING
- SUPPORT

FOR THE FOLLOWING AREAS:

- OPERATING SYSTEMS
- COMPILER DEVELOPMENT
- DATA BASE MANAGEMENT
- PERFORMANCE TESTING
- TRANSACTION PROCESSING

Programming applicants should have a degree in Computer Science or equivalent. Experience with higher level implementation languages is desirable.

If you have Xerox CP-V experience or experience in other large multi-use systems environments, join Honeywell and the CP-6 development team.

THE SEARCH IS ON

Please send your resume and salary history to:

Ms. Martha Andreani
Honeywell Information Systems
5250 W. Century Blvd., Suite 260
Los Angeles, CA 90045

Honeywell

An Equal Opportunity Employer M/F/H

The ROMAC DIFFERENCE

Opportunity When?

In our interview we will spend considerable time talking about the future — next year and five years ahead. We think total career planning is important to the EDP professional as it is to our client company. That's a Romac difference and why many of the nation's most capable professionals come to us.

Talk to us about many solid career opportunities like these representative positions

Project Manager	Atlanta	$35,000
Hardware Software Analyst	Charlotte	$27,000
DP Manager	Portland	$25,000
Database Administrator	Wellesley Hills	$35,000
Super Tech Support	Rhode Island	$28,000
Sr & Jr Analyst	Rochester	$28,000
Mini-Computer Specialist	New Haven	$40 000
Sr Systems Programmer (2)	Buffalo	$26,000

ROMAC & ASSOCIATES
Personnel Consultants

[illegible]

PROGRAMMER ANALYSTS

Accepting the challenge is your job... Providing the challenge is ours.

Challenging opportunities are available for professional programmer/analysts with at least six months experience — we're growing to make room for you

Please send resume to

Joe Tirado
Spear Street Tower
1 Market Plaza Suite 1018
San Francisco CA 94105

or

Dan Grainger
500 E Carson Plaza
Suite 224
Carson CA 90746

or

Mike Odom
10300 N Central Expwy
Building #1
Dallas Texas 75231

informatics inc

ADAPSO SOFTWARE INDUSTRY ASSOCIATION

[illegible]

SYCOR

SYCOR, INC., a leader in the manufacture of distributed data processing systems is currently seeking a qualified:

PRODUCT SPECIALIST

This position requires a degreed individual with a minimum of five years experience as an Analyst or Programmer in IBM 360 or 370 programming of IBM 3270 terminals. Experience in CICS and IMS is desirable.

Responsibilities include providing technical expertise to the Marketing Department and support of field sales in their marketing efforts.

In addition, this individual will assist in configuring new products, help to identify needs in the marketplace and to provide input to the product planning function.

We offer excellent fringe benefits, competitive salary and outstanding promotional opportunities.

Send resume with salary history or call:

Len Thielk, Personnel Specialist

SYCOR, INC.
A Northern Telecom Company
P O Box D • 100 Phoenix Drive
Ann Arbor, MI 48106

Equal Opportunity Employer M F

"Sycor Puts Computer Power Where the Work is"

DATA PROCESSING CONSULTANTS

We are a leading international CPA firm with a well established management consulting practice offering a variety of challenging projects. Our continued expansion in data processing has created several career opportunities for qualified individuals in Los Angeles, San Francisco, and Seattle.

Ideal candidates will have 1 to 3 years of experience and meet the general qualifications outlined below.

MEDICAL INFORMATION SYSTEMS

- Experience with data base, data communications or distributed processing.
- Experience with group of facilities.
- Good working knowledge of at least one ancillary department.
- Exposure to financial systems a plus.

COMPUTER PERFORMANCE EVALUATION

- Minimum of 2 years IBM System software experience.
- Good working knowledge of several of the following: OS, VS, CICS, IMS, TSO, etc.
- Exposure to performance evaluation techniques such as hardware and software monitors, simulation, performance analysis a plus.

Responsibilities will include these challenges: problem definition, problem solving, system evaluation, system functional design, long range planning, feasibility analysis, and hardware and software selection.

The successful candidates must have an undergraduate degree and preferably an MBA, CDP, or CPA. In addition, each candidate must have demonstrated the ability to communicate both orally and in writing with all levels of management and to be creative, practical problem/solver. Personal characteristics should include a high degree of initiative, drive and professional capacity.

We are offering starting salaries commensurate with ability, education and experience; limited travel and an environment in which you will directly influence the rate of your advancement. Please send resume and salary history in strictest confidence to:

CW Box 1777
797 Washington St.
Newton, MA 02160

Equal Opportunity Employer M/F

INSURANCE SYSTEMS

As we continue to specialize exclusively in insurance data processing, client company position openings for high quality professionals are increasing. Current search assignments include the following:

Sr Consultant -	Ind. Life Insurance, Advanced Systems-Northeast	to $30,000
	Group Insurance - Proj Mgmt-New England	to $33,000
Project Manager -	Ind. Life, Design-Northeast	to $30,000
	Ind. Life-Southwest	to $26,000
	Group Insurance-Midwest	to $30,000
	Ind. Life-New England	to $25,000
Sr Analyst -	Ind. Life-Northwest	to $28,000
	Group Ins.-Midwest	to $28,000
	Ind. Life-Southwest	to $25,000
Sr Programmer -	Ind. Life - ALC-Midwest	to $25,000
	Ind. Life - ALC-Southwest	to $25,000
	Ind. Life - COBOL or ALC-Northeast	to $27,000
	Casualty-Southeast	to $25,000
	Casualty-Southwest	to $24,000

If you have 2 or more years experience and are currently working in the insurance field, call or write to discuss personally with Jack Edwards.

Jack Edwards Associates
380 Maple Ave West
Vienna, Va. 22180
(703) 281-0919

SYSTEMS ANALYST

SPERRY UNIVAC

Pittsburgh, Pa.

The Houston Energy Branch has an immediate opening for an 1100 generalist with ASSEMBLER and FORTRAN software support experience, including OS1100 and Systems Generation experience. Project leadership background is preferred.

We offer an excellent salary and benefits program, plus unlimited growth opportunities with the fastest growing mainframe vendor and pioneer in the art.

If you have a college degree and the above qualifications, please call collect or send resume to:

R.J. Tollett
Sperry Univac
6700 West Loop South
Bellaire, Texas 77401
(713) 661-2053

SPERRY UNIVAC

Sperry Univac is a division of Sperry Rand Corporation

Making machines do more so man can do more.

An Equal Opportunity Employer M/F

DATA PROCESSING

Find out about the exciting career challenges available with AMTRAK

While we currently operate one of the most sophisticated DP centers in America, we are planning a major upgrade to IBM 3033 to meet the challenges of the 80's. Our present environment includes IBM 370/158 operating under OS MVS with IMS, JES 2 and RJE. Also included are PDP 11's (models 34, 40 and 55) operating with RSX-11M. This is a great opportunity to plan systems for on-line reservations, traffic control, labor management and many other technical challenges. Key positions are available for talented persons with 2 or more years progressive experience in the following areas:

SYSTEMS PROGRAMMING

Requires experience in TP network design, ACP

DATA BASE DESIGN AND IMPLEMENTATION

Requires experience in IMS, UCC 10 data dictionary

APPLICATIONS PROGRAMMING

Requires experience in IMS, DB/DC Systems, ACP real time applications, comprehensive and management and materials management systems.

In addition to a rare technical challenge, we offer excellent salaries and an extensive benefit program that includes relocation. If you are interested and qualified, please send your resume for prompt, confidential consideration to: William H. Thornton, Manager of Personnel

Amtrak

400 N Capitol St NW
Washington, DC 20001

An Equal Opportunity Employer M/F

---

western union

PROGRAMMERS ANALYSTS

•Systems •Applications

Challenging and rewarding opportunities working on new and evolving nationwide real-time communications and data base applications. These systems involve the use of both Univac 1100 Series computers and micro-processor based equipment.

Opportunities for senior and junior level Programmers and Programmer Analysts at our Northern New Jersey Technology Center.

You should have at least 2-10 years' experience in any one of the following areas:

- EXEC-8 and DMS 1100 for real-time applications on Univac 1100 Series hardware.
- Applications programming for real-time and data base systems on Univac 1100 Series hardware.
- Micro-processor programming for real-time communications applications.

Salaries will be commensurate with experience and education. Submit resume including salary history, in strict confidence to: Mr. R.I. Freifeld, Director of Professional Employment, Dept. NT 1119.

Western Union Telegraph Company

One Lake St., Upper Saddle River, N.J. 07458

An Equal Opportunity Employer M/F

EQUITABLE GENERAL INSURANCE GROUP

CONSIDER THE FACTS

You'll be working in Fort Worth, Texas, rated by a national independent survey as the 2nd best area in the country to live. No state income tax. No frustrating traffic jams. Clean air and a good climate where the sun shines an average of 250 days a year. A large city with a small city image.

You'll be working with the latest IBM hardware and software including the new generation 3033 under OS/IMS/MVS.

You'll be working for Equitable General Insurance Company which offers the opportunity of a lifetime to qualified individuals to meet the challenges of one of the country's fastest growing property and casualty insurance companies. Liberal benefits and excellent relocation package available.

CURRENT OPENINGS INCLUDE

Assistant Manager — Automobile Systems — Solid background in the property and casualty insurance industry with heavy exposure to Auto policy issue and rating systems. At least one year supervisory experience required.

Systems/Software Programmer — 2 years exposure to large scale IBM/OS operating systems

Programmer/Analyst — Prefer 1-3 years COBOL experience in business applications with exposure to OS JCL a plus. Analysis and user contact experience is important to our operations

Systems & Procedures Analyst — College degree and background in property and casualty insurance with claims or underwriting experience preferred or a procedural background with proven writing skills regardless of business environment. Qaulified applicant will analyze and document procedures as well as prepare data system specifications. Heavy interface activity with user departments

Our company will quadruple its size in the next 4-5 years. Because of this growth, our positions offer positive career progression.

For more information call Gary Penn
toll free at 1-800 433-1560.
In Texas call 1-800 792-1060
Or send Resume including salary requirement to:

EQUITABLE
GENERAL INSURANCE GROUP
One Equitable General Place Fort Worth Texas 76151

A SUBSIDIARY OF THE EQUITABLE LIFE ASSURANCE SOCIETY OF THE UNITED STATES
An Equal Opportunity Employer M/F/H

EDP INTERNAL AUDITORS

LOS ANGELES & PITTSBURGH

Internal promotions have created opportunities for data processing professionals with 5-10 years experience in application systems development (MBA preferred). Outstanding growth spot for individuals with proven oral and written communication skills along with analytical ability.

Travel will be extensive for period of 18-24 months followed by the opportunity for promotion to data processing or financial management positions. The successful candidates must be able to exercise independent judgment routinely and deal effectively with all levels of management throughout the corporation.

Diverse responsibilities will include assignments in all areas of systems and data processing. For immediate confidential consideration, send resume with salary history to:

G.W. BROWN
Administrator Professional Staffing
ROCKWELL INTERNATIONAL
600 Grant St., Pittsburgh, Pa. 15219

Rockwell
International

Equal Opportunity Employer M/F

MAKE THE DANRAY/NTI CONNECTION

As the "State of the Art" manaufacturer of highly advanced computer controlled telephone switching systems, DANRAY, a division of NORTHERN TELECOM, has several positions available in the Dallas area which will challenge your abilities and experience.

SOFTWARE OPPORTUNITIES

***Programmer/Analysts *Software Design Engineers**
***Diagnostic Programmers *Data Base Coordinator**
***Product Software Support Engineers**

Positions require 1-3 years related telecommunications experience in real time minicomputer environment. BSCS, BSEE or equivalent required.

ENGINEERING OPPORTUNITIES

***Reliability Engineer *Product Engineers**
***Transmission Engineer *Program Managers**
***Hardware Design Engineers**

Background should include 2 plus years experience in related voice/data communication environment. BSEE required with knowledge of hardware configuration a plus.

DANRAY offers excellent benefits and salary. If you desire an environment where your future is up to you, then please call collect or send your resume in confidence to Jeff Lewis.

(214) 234-5001
1201 East Arapaho Road
Richardson, Texas 75081

DANRAY®
A DIVISION OF NORTHERN TELECOM, INC.
An Equal Opportunity Employer, M/F

SYSTEMS ANALYSTS

Develop manufacturing software in a MIS operation that offers a showcase for your talents.

If you're a Systems Analyst who has worked in obscurity long enough, here's a chance to be in the limelight. NCR is rapidly expanding its MISSION (Manufacturing Information Systems Support Integrated on Line) operation at Dayton headquarters. We're creating manufacturing control systems for dozens of industries using the very latest on-line data base concepts directed toward full integration of major systems. You'll be working in a high-achievement, fast-accelerating organization where contributions are very quickly noted and rewarded. If you're searching for a chance to look good and keep moving upward, this is it.

We are looking for 4 things: (1) Demonstrated ability to conceptualize practical systems solutions to a variety of business needs; (2) good knowledge of real-time data base techniques; (3) a degree plus COBOL experience; and (4) previous development/support of systems like Bills of Material, Inventory Control, MRP, Work-in-Process or Purchasing. Some openings exist for people with lesser credentials.

Moreover, you'll be working—and enjoying life—in a notably friendly, unstressful Midwest suburban/metropolitan center where ample housing costs about half what it does in typical areas of EDP concentration like the Northeast or West Coast. Dayton is a city of less than a million with few urban woes. Highways are excellent and traffic is generally light and free moving. Schools are tops. Cincinnati, within easy driving distance, offers first-class professional basketball, baseball, hockey and football. The ideal location, year 'round, for sports enthusiasts.

**For prompt consideration, send full confidential resume and salary history to:
Max A. Anderson,
Corporate Recruitment,
Dept. P50, NCR Corporation,
Dayton, Ohio 45479.**

NCR
Complete Computer Systems

An equal opportunity employer

Detach here, moisten and seal envelope securely before mailing.

Fold and insert order form (attached through binding) and remittance here

USE THE ATTACHED ORDER FORM AND THIS ENVELOPE FOR:

- *a new subscription*
- *new address*
- *new title*
- *new industry*

first class
permit no 40760
newton ma

BUSINESS REPLY MAIL *no postage stamp necessary if mailed in the United States*

postage will be paid by

CIRCULATION DEPARTMENT

COMPUTERWORLD
797 Washington Street
Newton MA 02160

DATA COMMUNICATION TECHNICIAN

UNITED COMPUTING SYSTEMS, INC., an established and growing national and international computer services firm, headquartered in Kansas City, has an excellent opportunity for a Data Communication Technician in both our Metro Chicago and New York City locations.

3-5 years experience required in data communication and/or mini computers.

We offer an attractive salary and excellent benefits including tuition reimbursement and pension program. Please submit resume including salary history to:

UNITED COMPUTING SYSTEMS, INC.
Attn: Jim Kline
2525 Washington
Kansas City, Missouri 64108

PEOPLE, SYSTEMS, AND SOLUTIONS UNITED

an equal opportunity employer, M/F/H

Tektronix Oregon Software

Our product variety and growth have added a necessity for motivated, qualified individuals with experience in state-of-the-art software. Positions such as the following are vacant right now.

Scientific Programmer
develop and maintain software for engineering and manufacturing support.

Software Project Engineer
develops high-level language software products for microprocessor-based system compilation systems.

Compiler Development
design of a retargetable, portable compiler for high level languages and programming language translation.

Software Engineer
direct a team of software designers for a firmware intensive logic analyzer project.

Evaluation Engineers
develop and execute test procedures for useability, reliability and functionality for software and firmware in graphic display products.

Sr. Software Engineer
design, development, and documentation of code generators and other software engineering tools for use on a variety of computing machines.

Firmware Engineer
design and implement firmware modules for microprocessor based terminal products.

Reliability Engineer
development of a software reliability program aimed at designing the reliability into the system.

Salary is open. Benefits include educational support, insurance and profit sharing programs.

If you plan to attend MIDCON in Dallas, please look us up at the booth. If you won't be there, please send your detailed resume and salary history to Mary Walhood, TEKTRONIX, INC., P.O. Box 500, N31, Beaverton, Oregon 97077.

An Equal Opportunity Employer m f h

Tektronix
COMMITTED TO EXCELLENCE

Software System Designers
ADVANCED DEVELOPMENT

We are a pioneering group of computer scientists working on an innovative application of computer technology to the office of the future. Guided by a unique understanding of the potential of office automation, we are developing an ambitious digital business system utilizing an integrated hardware/software engineering effort.

We need creative individuals with computer science backgrounds (M S preferred) and a minimum of two years experience in operating systems, compilers, or communications software development who are anxious to become involved with subjects such as:

- Parallel Microprocessors
- Fault Tolerance
- High-level Language Architecture
- Security And Protection
- Data Bases
- Distributed Networks

Your responsibilities will include contributing to the system's architectural definition, designing components of the system, and providing programmer leadership during implementation. You must be goal oriented and capable of setting your own objectives with a minimum of direction.

Our attractive Connecticut location offers a quiet New England environment with abundant recreational opportunities and large metropolitan areas within easy reach. To learn more about these career opportunities in our rapidly expanding group, send your resume in confidence to:

Manager, Professional Employment
Department C 1127
Burroughs Corporation
105 Newtown Road
Danbury, Connecticut 06810

An Equal Opportunity Employer M/F

Burroughs

Take the shuffle out of the search. Subscribe to the Computerworld Index.

(For details, call or write our Ciculation Department)

COMPUTERWORLD

Walk through our Involving Doors.

[illegible]

the jarvis walker group

customer engineers

Our rapid growth has created career opportunities in our Field Service Group for experienced Customer Engineers with 3-5 years demonstrable experience in identifying, isolating and repairing system malfunctions. Scope of responsibility includes customer installations, preventative and corrective maintenance procedures in all aspects of systems and associated peripherals, as well as installation and testing of both upgraded and new software and hardware products.

We are TANDEM COMPUTERS, the only manufacturer who offers a NonStop^{tm} multiple processor computer. It's the most important development since the development of the minicomputer itself and has experienced dramatic product acceptance.

Come show us how you can contribute to the successes of TANDEM. Not only are the opportunities real and the rewards significant, but we are able to offer you unique "big company" benefits

- MEDICAL TO INCLUDE MATERNITY, DENTAL, ORTHODONTIA & GROUP VISION CARE
- LIFE, AD&D & LONG TERM DISABILITY INSURANCES
- STOCK PURCHASE PLAN
- CREDIT UNION
- 6-WEEK SABBATICAL LEAVE WITH FULL WAGES, INDEPENDENT OF YOUR VACATION, EVERY 4 YRS.
- ALONG with normal Vacation, Holidays & Sick Leave Benefits

To arrange a

New York Interview

CALL COLLECT TO
Larry McAllister
212/594 2320

Or Send your resume immediately to Larry McCallister C/O TANDEM COMPUTERS, INC., 1 Penn Plaza, Suite 2234, 250 West 34th Street, New York, N.Y. 10001.

TANDEM
COMPUTERS

An equal opportunity employer

SYSTEMS PROGRAMMER/ANALYST

Battelle, one of the world's leaders in research and development, has an immediate need for a Systems Programmer/Anayst with a BS degree in Engineering. You must have 2 or 3 years experience/background and a demonstrated proficiency in FORTRAN programming. Ability to programin simulation languages such as GASP, DYNAMO, GPSS and NUCLEUS would be a plus

Excellent opportunity for career development and to assume increasing responsibility; professional atmosphere, excellent salary, and generous benefits. Send resume in confidence to: Leslie G. Hill, Manager, Employment

Battelle
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201

An Equal Opportunity Employer M/F

DATA BASE CONSULTANT
UNUSUAL OPPORTUNITY

Leading international Data Base consulting firm has immediate openings for qualified professionals in New York and Washington D.C. Skills and experience in Data Base Management Systems (IMS, IDMS, TOTAL, S2000, ADABAS) and/or Data Dictionary Systems is essential. Ability to communicate effectively verbally and in writing is desirable.

Compensation commensurate with experience. Exceptional benefits. Send resume to:

DBD SYSTEMS, INC.
77 North Centre Avenue
Suite 304
Rockville Centre, NY 11570

Applications Programmers:
The fast track is right here.

If you're currently working in the data processing center of a bank, insurance company, or other large business, why not put your skills to work in a front-line computer environment where they can do your career the most good? The action you're looking for, with the direction and potential you want, is right here at Honeywell's Information Systems Center.

Whether your interests direct you toward a management future, or you see yourself as a high-level software specialist, your work at the Information Systems Center will be the ideal preparation. We can offer you broad opportunities in both minicomputers and large computer systems, plus the chance to engage in program development directly from a terminal.

Responsible for developing applications systems that measure, report, and control Honeywell's business operations, you'll have direct contact with, and necessary training in distributed processing, data base, and the full range of Honeywell's state-of-the-art products. With this scope of knowledge you will become a very valuable person at Honeywell; your opportunities for growth and advancement will be unlimited in such areas as software development and applications support, nationwide, throughout the Honeywell organization.

We're looking for people at most levels of experience in minicomputer or large computer application programming in a COBOL environment.

If interested in outstanding growth potential within a stimulating computer environment, come to Honeywell's Information Systems Center. For talented applications programmers with a successful career in mind, it'll be only the beginning.

Please forward your resume and salary history to: Dorothy C. States, HONEYWELL INFORMATION SYSTEMS DIVISION, MS-466, 200 Smith Street, Waltham, MA 02154.

An Equal Opportunity Employer M/F

THE SEARCH IS ON

Honeywell

PROGRAMMER ANALYST

Profitable Co. needs prog with RPG II proficiency. Must have exp with Systems III, Mod 12 or 15. High visibility position reports to DP Mgr. Resp. include design, prog. and implementation of mfg. systems. $16,000. (Fee Paid) Contact P. Siegal

ROBERT HALF
PERSONNEL AGENCIES
1310 Liberty Bank Bldg.
Buffalo, N.Y. 14202
(716) 842-0801

THIS
SPACE
FOR
HIRE.

[Inquire at Classified Advertising Dept.]

MANAGER

United Banks Services Company
Denver, Colorado

Advance your career in an outstanding management position now available with a computer service company of the largest bank holding company in a unit-banking state. We desire applicants with proven management skills in a financial environment. This position is available on our night check processing operation. We offer you the chance to combine excellent fringe benefits and career opportunity in a progressive company with the appealing lifestyle of Denver and the Rocky Mountain Region.

Qualified applicants should send resume to:

Susan B. Romero
P.O. Box 17006
Denver, CO 80217
or call COLLECT: (303) 770-2400

An Equal Opportunity Employer M/F

Sun
Sun
Sun
Sun
Sun
Sun
Sun
Sun
Sun
Sun
Sun
Sun
Sun
Sun
Sun
Sun
Sun
Sun
Sun
Sun

ACCOUNT MANAGERS

Dynamic Expansion = Account Management Positions In Multiple Locations, Nationwide.

Sun Information Services Company, Inc. (SIS), a new and wholly owned subsidiary of Sun Company, Inc., markets a complete line of data processing equipment and services. The extremely rapid acceptance of SIS in the Data Processing marketplace has created numerous exciting positions at local offices in Philadelphia, New York, New England, Houston, Dallas, Tulsa, Washington D.C., Chicago, Los Angeles, and Princeton, N.J.

The successful candidate's responsibilities will include the marketing of Sun Information's D.P. equipment and services within an assigned territory. You will determine prospective customer sales potential, prepare formal proposals; develop, formulate and implement programs for finding, screening and securing new business; negotiate terms and participate in the development of legal contracts, operating and service agreements and other documents. In addition you will be expected to conduct account analysis and maintain liaison with the customers in order to insure current and future demands are met.

To quality, you must have knowledge of data processing, telecommunications and computer services marketplace, be a skilled communicator, possess a college degree and direct sales experience to all levels of management.

SIS provides excellent opportunities for advancement and professional satisfaction, a highly competitive salary and incentives program, and a full range of company benefits. Interested applicants should send their resume, including salary history and requirements, in confidence to: Mr. J. S. Stewart, SUN INFORMATION SERVICES COMPANY, INC., 1608 Walnut St., Philadelphia, Pa. 19103. An Equal Opportunity Employer M/F/H/V

Sun INFORMATION
SERVICES
COMPANY

The GOOD Life

Everyone wants to have enough money to do the the things they enjoy. **ASC employees have that money.** They are professional programmers and analysts who not only expect a lot, but deserve a lot from the company they work for. Call us – we think you'll be surprised at the salary and benefits we can offer **YOU.**

(800) 543-7583

ALLEN SERVICES CORP.

DAYTON AIRPORT OFFICE
212 West National Road
Vandalia, Ohio 45377

in Ohio call collect
(513) 890-1200

Serving All Fifty States

An Equal Opportunity Employer M/F

Software Professionals

Software Development Programmers
(for Princeton and Dallas)

Openings at all levels for qualified programmers and analysts who have the capabilities for developing sophisticated, state-of-the-art software. Assembly language experience essential.
Experience with on-line systems (CICS, ROSCOE, TSO, etc.) or knowledge of DOS or OS internals is a definite plus. If you have participated in the development of any type of software packages—system, utility, or application—we would really like to talk to you.

MetaCOBOL Support Specialists
(for N.Y.C., Chicago or Washington, and Houston or Los Angeles)

Train new customers in the use of MetaCOBOL, ADR's generalized pre-compiler for COBOL applications development and maintenance. Experienced in COBOL programming and macro processing. Good communication skills essential. Traveling required.

MetaCOBOL Product Specialists
(for Washington and Houston or Los Angeles)

Assist in presenting and reviewing MetaCOBOL to new prospects. Must be experienced with COBOL programming and commercial business applications. Good communication skills essential. Traveling required.

Please send your resume in complete confidence including current salary and position desired, to: Director, Software Products Division. Or call 609 921-8550

APPLIED DATA RESEARCH THE ON-LINE SOFTWARE BUILDERS
Route 206 Center, CN-8, Princeton, N.J. 08540

An Equal Opportunity Employer m/f/h/v

SYSTEMS PROGRAMMER

Major computer mfr. seeks sharp systems programmer for state-of-the-art software/hardware development. Requires MVS, JES-2, VM exp. Real growth oriented co. Salary to $30,000. Contact Gerry Battista (Fee Paid.)

ROBERT HALF
PERSONNEL AGENCIES
140 Federal St.
Boston, Mass. 02110
(617) 423-6440

SOFTWARE PROGRAMMER

DENVER

Rapidly growing energy resource service company headquartered in Denver has immediate need for a light to intermediate level software programmer to work with data base support group using IDMS on IBM 370/145, DOS/VS. Minimum 1 year data base experience. TP, IDMS, or system programming experience helpful. Send resume including salary requirements to:

Personnel Manager
P.O. Box 2612
Denver, Colorado 80201
Equal Opportunity Employer M/F

HOUSTON'S TEMPERATURE IS 80°

WHAT'S YOURS?

Outstanding Opportunities!

Banking
Hospital
Insurance
Engineering
Oil & Gas
Manufacturing
Consulting
Contractors

HOUSTON'S LEADING PERSONNEL RECRUITERS

the DPCenter

4615 SW Fwy.
Suite 960E
Houston, Tx. 77027
(713) 960-9102

A Division of the Leslie Corp.

GETTING AHEAD IN EDP. MADE SIMPLE.

Today, there are EDP career opportunities everywhere you look. With so many companies dangling carrots, getting ahead and staying ahead is now the name of the game. Yet to go at it alone is risky and laborious.

Now there's a shortcut: Logical Options. We'll explore your options and set up the means for you to get exactly what you want. The job, the technology and the salary. Talk to the EDP specialists. Call, come in, or send your resume, and let us recruit you for your future.

Employer Retained Career Placement Service.

LOGICAL OPTIONS INC.

One Market Plaza, Spear Tower
#2014A San Francisco CA 94105 415/777-3900

twin city federal
data processing center

SENIOR PROGRAMMER & SYSTEMS SOFTWARE ANALYSTS

Due to rapid expansion and upgrading, one of the Midwest's largest Savings & Loan Associations has several employment opportunities in its ultra-modern data center. We are currently converting from a 370/158 DOS/VS environment to a 3032, 370/158 MVS environment.

SENIOR PROGRAMMER ANALYST—Prefer 2-5 years experience in applications programming with knowledge of BAL OR 3600 financial terminal programming language.

SENIOR PROGRAMMER ANALYST–SYSTEM/7—Prefer experience with System 7 teleprocessing and/or very heavy BAL experience with some BTAM coding.

SYSTEMS SOFTWARE ANALYST—Prefer 2 or more years systems support experience. Should have knowledge of OS system and TSO, preferably in an MVS environment. Must have experience with large IBM systems.

TCF offers a convenient location in the heart of beautiful downtown Minneapolis, pleasant working atmosphere, excellent company benefits, in addition to an internal promotion program. Join us in year around recreational and cultural activities in the Land of 10,000 Lakes. Please submit your detailed resume and salary requirements in confidence to:

Lori Hiatt
Personnel Department
TWIN CITY FEDERAL SAVINGS & LOAN ASSOCIATION
301 Marquette Avenue
Minneapolis, MN 55402

AN EQUAL OPPORTUNITY EMPLOYER

READY FOR THE 3031?

A newly installed 3031 supports our expanding manufacturing operations. The current environment is DL/1, CICS, VM/CMS, POWER VSAM, DOS/VS, with a planned conversion late next year to OS.

COBOL programmers, system programmers and system analysts with at least 2 years experience are needed to develop and maintain financial and/or manufacturing applications. We are utilizing MSA on-line payroll personnel, 12 location CICS order processing, MRP, shop scheduling, and tooling data base.

Our attractive Orange County location, industry leader position, job responsibilities, company paid benefits, and management style offer the kind of working environment to meet your professional expectations.

Indicate current or future interests in opportunities by sending a resume to Barbara Fauro.

17871 Von Karman Ave. ● P.O. Box C-19511
Irvine, CA 92713 ● (714) 957-3600

An Equal Opportunity Employer M/F

SMITH TOOL
[illegible] Smith International Inc

[illegible]

Ætna Life & Casualty has an immediate opening in its Corporate Audit Department to perform and/or supervise individual audits involving evaluating controls in systems during development stages, data center operations and system support software.

Candidate must have a minimum of 3 years heavy data processing audit experience including exposure to large scale processing environment with on-line features and data bases, and 4-5 years in Data Processing Systems Analysis or Programming. Exposure to insurance industry helpful. Good interpersonal skills and ability to communicate effectively essential. College degree preferred.

Salary commensurate with qualifications and experience.

Send resume to Dorothy Syretz,
Recruiting Office, Ætna Life & Casualty,
70 Farmington Avenue, Hartford CT 06156.
An equal opportunity employer.

Ætna
LIFE & CASUALTY

SOFTWARE SPECIALISTS

Opportunities In
SURFACE WEAPONS TECHNOLOGY
with
SPERRY UNIVAC
Dahlgren, Virginia

If you would like to combine an ideal location with challenging and reward responsibility, here is your opportunity. The Dahlgren, Virginia operation of Sperry Univac's Technical Services Division is located approximately 60 miles from Washington, D.C. and 26 miles from Fredericksburg, Va. You'll be working with us in support of the Naval Surface Weapons Laboratory on sophisticated software projects involving the design, development and integration of the following naval systems:

- WEAPONS SYSTEMS FIRE CONTROL
- REAL TIME APPLICATIONS
- TACTICAL SOFTWARE
- SHIPBOARD COMMAND AND CONTROL

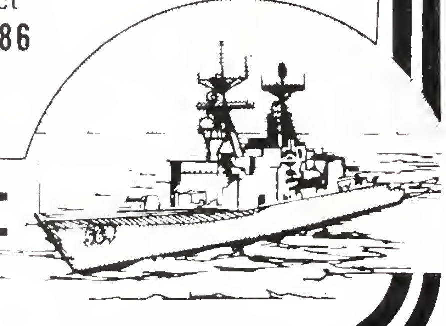
A background in the above areas and the following experience is desired:

UNIVAC AN/UYK-7, AN/UYK-20 or other
UNIVAC military computers
REAL TIME ASSEMBLY LANGUAGE
ULTRA-32, ULTRA-16, CMS-2, CS-1,
and JOVIAL
DEGREE OR EQUIVALENT EXPERIENCE

These career opportunities offer an excellent benefits package including company paid Dental Plan.

Just Call This
TOLL-FREE NUMBER
1—800—336—0271
in Virginia, collect
(703) 558—4486

Or Rush Resume to: John DePrima, Technical Services Division, 1901 N. Moore Street, Arlington, Va. 22209



SPERRY UNIVAC
TECHNICAL SERVICES DIVISION
An Equal Opportunity Employer M F H

---

150 DATA PROCESSING PROFESSIONALS

DASD Corporation, a national consulting firm specializing in software product development and customized programming and system design, is seeking data processing professionals for positions on our contracting staff. Assignments are available in all 15 DASD branch offices throughout the U.S.

We are seeking individuals with a background in any of the following areas:

- Programming
- Systems Analysis
- Software Analysis
- Date Base Analysis
- Project Leadership
- Project Management

In addition, the individuals should have a minimum of three years experience in at least one of the following areas:

• COBOL • BAL • CICS • PL/1
• TP • IMS, DL/1 • TOTAL • TSO

We are interested in career oriented professionals who are seeking challenge and opportunity while gaining tremendous experience and exposure in the data processing industry. We offer above average salaries and benefits.

If you have the qualifications we are looking for, don't hesitate to submit your resume or call for an interview appointment.

DASD CORPORATION

9045 N. Deerwood Dr. (414) 355-3405 Milwaukee, Wis. 53209

DASD
CORPORATION

An Equal Opportunity Employer M/F

SYSTEMS ENGINEERING MANAGER

(Denver)

Data General, one of the industry's leading computer systems manufacturers, is seeking a District Systems Engineering Manager located in Denver, Colorado.

As District Systems Manager you will hire, train and motivate a force of Systems Engineers located in Colorado, Wyoming, Montana, Idaho, and Utah. You will work closely with our District Sales management team in planning strategies for our commercial end-users sales effort.

As a successful candidate, you will have managed professional data processing personnel in a minicomputer vendor or end-user environment. You will also have a strong technical background in computer systems or applications development and possess excellent customer liaison skills. As a member of our management team you will become a vital part of a nationally known sales force helping to market a broad spectrum of competitively priced and compatible computer systems products. We offer a highly competitive compensation/benefits package including automobile allowance, plus the potential for an attractive bonus. In addition, you will be provided with the opportunity for rapid advancement that only an industry leader with a ten year compounded annual growth rate of 50% can provide.

Send your resume in confidence to Jim Raisio, Regional Systems Manager, Data General Corporation, 2445 Faber Place, Palo Alto, CA 94302. Or telephone Jim collect at (415) 321-8010.

Data General

You can get there quicker from here.

PROGRAMMER ANALYST

Tampa, Florida

Major building materials company of Jim Walter Corporation has positions available at its headquarters location.

Requires 2 to 5 years experience in systems design and programming. Experience should include COBOL, CICS in an OS/VS environment.

Excellent working conditions, merit salary program plus complete benefit package. Reply in confidence by letter/resume including salary history to Employment Supervisor.

Celotex

P.O. Box 22602
Tampa, Florida 33622

a Jim Walter company

We Are An Equal Opportunity Employer M/F

BUY SELL SWAP

IBM UNIT RECORD EQUIPMENT

Mach	Sale	Lease	Specials		Mach	Sale	Lease
026	$750	$30/mo	**108**	**$3500**	085	$1200	$60/mo
029	$1750	$50/mo	**360/20**	**$6000**	088	$1500	$100/mo
082	$800	$30/mo	**1403(2)**	**$6900**	129	$3200	$110/mo
083	$1700	$60/mo	**2560**	**$4500**	548	$1500	$60/mo
084	$2250	$90/mo	**3348(70)**	**$1200**	557	$3100	$100/mo

Other Machines Also Available

WANTED TO BUY: 3741, 3742,
ALL TYPES OF DISC PACKS

THOMAS COMPUTER CORPORATION
600 North McClurg Court
Chicago, IL 60611 (312) 944-1401

FOR SALE

Color Video Cassette Player 3/4"
Excellent condition less than 60 hours of use
Model No. CP-5200U

RCA XL-100 Color Television 19"
Good condition
Model No. FB 444 W

Video Cassette Courses
CICS/VS Application Programming
VSAM Concepts and Access Method Services Usage (DOS/VS)

MAKE OFFER

Contact
RICH HRAPCZYNSKI
(215) 922-3600

2314-B1

- Up to 9 SPINDLES
- 60 m.s. average access time
- Two channel switches available
- Immediate delivery — Sale or Lease

COMDISCO
312-698-3000

Surplus DEC And Data General Hardware

BUY SELL

Byan Eustace	— DEC —	(305) 272-2338
Phil Thomas	— DG —	(305) 272-2339

Thomas Business Systems, Inc.

IBM EQUIPMENT

Available 360/20/C1

Wanted 3344/B2

Wanted 148/K

Wanted 3211/3811

FORSYTHE McARTHUR
212-283-7800 NEW YORK
404-586-0370 ATLANTA
214-748-4690 DALLAS

(312) 943-3770

FORSYTHE McARTHUR ASSOCIATES, INC
919 NORTH MICHIGAN AVENUE CHICAGO ILLINOIS 60611

FOR SALE

Data General

- Nova 3/12 System
- 32K wds
- 10 MB Disk
- 9 Track Tape
- 300 LPM Printer
- (1) 6012 CRT
- (1) 4063 MUX
- 400 CPS PTR
- Dual Cabinets

$32,000.00

90 day on-site service after installation in most major cities.

214/357-5725

USB
U.S. BROKERS INC.
2636 WALNUT HILL LANE
SUITE 347-348
DALLAS, TEXAS 75229

BUY SELL LEASE

Tapes
3420's
3803

Disks
3330
3340
3350
3830

Terminals
3271
3277

Changing your equipment! Before returning CPU's and peripherals to IBM — call **ALANTHUS** — You'll profit by the change.

Contact: **George Forsythe**
(203) 226-7501

alanthus computer corporation

315 Post Road West
Westport, Conn. 06880

Member **CDA**

DEC SALE

32 DIFFERENT PROCESSORS

11/03		4K	MOS
11/03		16K	MOS
11/04	5¼″	8K	MOS
11/04	5¼″	16K	MOS
11/04	5¼″	24K	MOS
11/04	5¼″	32K	MOS
11/04	10½″	16K	CORE
11/04	10½″	32K	CORE
11/04	10½″	8K	MOS
11/04	10½″	16K	MOS
11/04	10½″	24K	MOS
11/04	10½″	32K	MOS
11/05	5¼″	8K	CORE
11/34	10½″	8K	MOS, KY11LB
11/34	10½″	16K	MOS, KY11LB
11/34	10½″	24K	MOS, KY11LB
11/34	10½″	32K	MOS, KY11LB
11/34	10½″	16K	CORE, KY11LB
11/34	10½″	32K	CORE, KY11LB
11/34	10½″	48K	CORE, KY11LB
11/34	10½″	64K	CORE, KY11LB
11/35	10½″	8K	CORE
11/34	10½″	16K	CORE
11/35	10½″	24K	CORE
11/35	10½″	32K	CORE
11/35	10½″	48K	CORE
11/35	10½″	64K	CORE
11/45	10½″	32K	CORE
11/45	10½″	64K	CORE
11/60		32K	MOS
11/60		32K	CORE
11/60		64K	CORE

OPTIONS

KT11C
FP11B
KE11B
KG11A
KW11P
OR11C
OL11WA
OU110A
BM873
M920
OH11AA
DH11AO

KT110
FP11C
KE11F
KW11L
DR11B
OR11K
OL11WB
BM792
M9301
M930
DH11AE
DZ11A

HUNDREDS OF OTHER OPTIONS AVAILABLE FROM OUR HUGE INVENTORY

For immediate quote and delivery of a component to a complete system . . .

CALL THE DATALEASE HOTLINE
800-854-0359

DATALEASE

700 No. Valley Street, Suite A
Anaheim, California 92801
(714) 533-3920 Telex 692439

370/135 MEMORY

For Sale or Lease

IBM H to HG

MEMOREX	96K to 256K
AMS	192K to 384K
AMS	144K to 320K
AMS	192K to 320K
AMS	256K to 384K
AMS	384K to 512K
AMS	512K to 768K
ITEL	256K to 512K

Call Dick Baker
(305) 561-5207

dataware
[illegible]
[illegible] Lauderdale, Florida 33306
telephone (305) 561-5207

Immediately Available
FOR LEASE

3333-1
3330-1

CALL: Bill Castellano
312/920-8181

NF COMPUTER SALES & LEASING CORP.
1211 W 22nd St., Suite 815 Oak Brook, Illinois 60521
Telephone 312-920-8181, Telex 206106 NFC OAKR

DEC

LP11-VA 300 lpm Printer	$7,000
LA30 DECwriter	$750
MF11-UR 32KW Memory	$3,500
MF11-WP	$3,750
DD11-B SPC Sys Unit (new)	$300
RK05 disk packs	$40

OTHER

CMI 32KW PDP11 add on memory	$1,750
Zilog Z80 development sys 48KB Memory, RIO operating sys, PROM programmers (new) ASPIO module (new) Integral desk	$5,500
OKIDATA CP110 line printer w/RS232 Interface	$850

Carl R. Boehme &
Assoc Inc.
800 San Antonio Rd.
Palo Alto, CA 94306
(415) 493-1655

AVAILABLE FOR LEASE

370s

158-3
155 J
145 I2
145 HG2
135 FE
135 I
125 H2

303X

LEASE ONLY

Your Position or Ours

- *CSA is the principal*
- *Short Term Leases Available*
- *Delivery & Installation Guaranteed Under Secured Documentation*
- *Configured To Your Needs*
- *Add or delete features as required*
- *Available immediately*

Call Patricia O'Leary
800-225-2036

Channels

(1) 2880-2
(2) 2860-3
(1) 2870-1

Memory

168 U35-U38
165 (4) 3360-5
158 I to K
155 (2) 3360-3
145 H2 to HG2
135 GD to GF

Disks

(1) 3830-1
(8) 3330-1

CSA
Computer Systems Of America Inc.
141 Milk Street,
Boston, Ma. 02109
(617) 482-4671

CSA is a private lease underwriter with a portfolio of more than $300 million in systems under lease to the world's largest corporations.

FOR SALE

GOULD 4800 PRINTING SYSTEM

Consisting of

- Writing unit
- Electronic unit
- Line controller

Plus

- Paper cutter
- Hardware interface for 360/65 to IBM 2860
- 9-Chan., 800 bpi, 100 ips mag tape handler & interface
- Software char. gen. option
- Variable char. option

CHEMICAL ABSTRACTS SERVICE
Mr. Gene V. Moss
P.O. Box 3012
Columbus, Ohio 43210
(614) 421-6940 Ext. 2925

DATAPOINT 6600

128K memory
600 line printer
40 K disk
Time available
2nd. and 3rd. shifts
and weekends

Call Harry Wellman
(415) 495-7784.

SALE
MODEL 43
Teletype Terminals

We have available for immediate delivery a limited number of new Model 43 pin feed Teletype® KSR's.

EIA Version	**$980**
TTL Version	**$820**

Washington, D.C. area buyer pick up and save shipping cost. All prices F.O.B. 611 Lofstrand Lane, Rockville, Md. 20850. Md. Res. add 5% sales tax. Certified check or money order only.

ATS LEASING
(301) 840-2226

CPI NEEDS A
Nov./Feb.
370/148

Will buy or lease with P.O.

Tom Robbins
Computer Properties, Inc.-612/831-6088

SALE/LEASE

DISKS	TAPES	MICR
3340	3420	1419
A2&B2	Mod 5	1412

3211 & 3811
printer and control

IMMEDIATE DELIVERY

Contact: Bernie Gest
215-635-1700
Computer Marketing Inc.
7704 Seminole Ave.
Melrose Park, Pa.
19126

Member Computer Dealers Assoc.

3033

(4/79) Lease Only

BARRETT
CAPITAL
& LEASING
CORPORATION
14 Redwood Road
White Plains, N.Y. 10605
(914) 761-0070

"WANT TO BUY"
1416 & 3216

PRINT TRAINS
(any condition)

1403, 3203, 5203
PRINT TRAINS,
CHAINS &
CARTRIDGES
(any condition)

write or call

COMPU-ACT CO.
200 State Rd. 52, Suite 201
Port Richey, Fla. 33568
813-863-2461

Inflation Fighters

Quality & Savings

Slightly used. Money Back Guarantee. Full Reels. All External Labels Removed. Guaranteed for use at 800 BPI through 6250 BPI

2400' Reel	$4.50 ea.
1200' Reel	$4.00 ea.
600' Reel	$3.25 ea.

All Tapes with Hanging Seals

We pay freight on orders over 200 tapes
All orders shipped within 48 hours

Call or Write

Computer Tape Mart
169 B New Highway
Amityville, New York 11701
[516] 842-8512

CPU WATER COOLING
FOR SALE

Unused Liebert Spacemaker Cooling Distribution Unit Suitable for 168, 3033 Available immediately.

Call Brian Davidson
(613) 746-4353

TI 810's

Immediate Delivery

New - In stock

10% OFF

Retail Systems, Inc.
Gaithersburg, Md.
(301) 948-5441

We encourage your inquiry about our unique programs for both purchased and leased equipment.

AVAILABLE FOR LEASE OR SALE

Please Note: All of the equipment offered is owned or controlled by Finalco.

CPUs	3125-GF (Any Term - Low Monthly Rate)	Now
	3135-H (lease only - Any Term)	Now
	3145-HGO	Now
	3145-H2	12/15/78
	3155-J, DAT (Lease only)	Now
	3158-AP4	12/1/78
	3158-U35 (Lease only)	1/1/79
	3158-M35 (1 YR Sub-Lease)	1/1/79
	3168-KJ	12/1/78
MEMORY	3148 K-J	Now
DISK	3830-2	Now
	(2) 3830-2	2/1/79
	3350-A2F	2/1/79
	(2) 3350-B2F	2/1/79
TAPES	3410-3SD	Now
	(2) 3420-3SD	Now

WE WANT TO BUY

CPUs	3138-J	Now
	3148-J or K	Now

IMMEDIATE REQUIREMENTS:
3211-1, 3811-1.

END USERS:
If you are returning CPUs or peripherals to IBM, let us buy them with your POCs. YOUR COMPANY WILL BENEFIT.

Contact: Bob Applegate

FINALCO
Computer lease underwriters and asset managers
8150 Leesburg Pike • Vienna, Virginia 22180
(703) 790-0970

Member Computer Dealers Association

WHY TAKE LESS?

WHEN WE PAY MORE

WANTED

IBM
029-129-3742-5496

BURROUGHS
L3000-L4000-L5000-L6000-L8000-L9000
TC700-TC3500-F5000-S103-S105

N.C.R.
299-399-499-775-270-275
31-32-36-41-42-43-152

WANTED

WILLIAM MARION CO. INC.
P.O. BOX 309, HACKENSACK, N.J. 07602

FOR MORE INFORMATION CALL (201)343-4554

AVAILABLE FOR IMMEDIATE SALE

2 - 360/40 G
1 - 360/40 H
2 - 360/50 H
5 - 2803's 1&2
6 - 2804's 1&2
6 - 2401 2
2 - 2401 3
2821, 2540, 1403-2

5 - 3420 6 w 6420
370/145 HG2
370/145 H2 w 768 K intel
2 - 3340 AL w 4301, 6202, 8150
1 - 3411 3 Feb. 15
1 - 3420 3 dd
370/155 5 ch. no dat

BOB STEVENSON
CHUCK STABILE
STEVE ZALESKIE

efm computer
leasing, inc.
3000 marcus avenue
lake success, ny 11040
(516) 488-7876

BUY SELL LEASE

SYSTEM/3

Models 15, 10, 8, 6
Systems 32 & 34
All Support Peripherals

COMPUTER BROKERS, INC.
P O BOX 28298
Memphis Tn 38128
Phone 901 372 2622
Member CDA

BUY • SELL • LEASE

IBM 029's—129's
3277's—3741's—3742's
Peripheral Equipment

026	- $ 800	088	- $2500
059	- 1375	514	- 800
082	- 800	519	- 950
083	- 1800	548	- 1500
084	- 2500	552	- 900
085	- 750	557	- 2800

MOHAWK-6401-6403 • NCR-736
COMPLETE LINE BURSTERS SHREDDERS DECOLLATORS AND BINDERS

CALL **DP SERVICE INC.**
STAN PELC or NATALIE REYES
312·774·2556
5505 N MENARD AVENUE CHICAGO ILLINOIS 60630

BUY • SELL

TELETYPE

MODELS

35 • 33 • 32

NATIONAL
TELETYPEWRITER
CORP.
207 Newtown Rd.
Plainview, N.Y. 11803
(516) 293-0444

FOR SALE
OR LEASE

Burroughs B-4700 System

8 I/O Channel 150K CPU, Card Reader, Card Punch, Line Printer, 4 Tape Cluster, 80 million characters of head per track disk.

Contact: B. Hogan
Dresser Industries, Inc.,
1505 Elm St
Dallas, Texas 75201
(214) 745-8809

PROFESSIONAL DEALER/LESSOR OF IBM COMPUTER SYSTEMS

Bob Russell
Mike Hamilton

SYSTEMS MARKETING, INC.
200 E. Thomas Road
Phoenix, Arizona 85012
(602) 264-5800 Telex 667-334

SMI

Want to Buy
HP 3000 II
with peripherals
Call Ms. Olson
301-340-6777

CMI BUY LINES

BUY-SELL-LEASE-TRADE Call (313) 362-1000

370/168
370/165
370/155
Market Information
Bob VanHellemont
or your CMI
Account Mgr.

370/158
Market Information
Ron Baker
or your CMI
Account Mgr.

370/135
370/138
370/145
370/148
Call your CMI
Account Mgr.

370/115
370/125
Lloyd Marks

3420 3803
3333 3830
3330 3340
Darryl Hastings

1403 2821
2540 2501
1443 1442
Joe Romeo

360
30, 40, 50, 65
Best of Values
Joe Romeo

3270 CRT's
Printers/
Controllers
Dorothy Trombley

SYSTEM/3
Models 15 & 12
Jerry Roberts

SYSTEM 32
3741-3742
5496
SYSTEM 3-6, 8, 10
Carole Solano

SYSTEM 34's
Available
Denny Pennington

360/20
1130
026, 029, 059
083, 085, 129
Marie Bednarz

BUY OF THE WEEK

3032-4 w/3850
Avail. Feb./Mar.
3021-8/79
3032-11/79
New Operating Lease
Plans Available

370
165 & 168
168 Available
(1) Dec. & (1) Jan.
With or Without A/P
Available Now:
(2) 2880-2 (1) 2880-1
(1) 2860-1 (1) 2860-2
Available Jan:
(1) 2870-1

370/158
3 Meg.
SALE OR LEASE
JANUARY

5410-A14-16K
5424-A01-MFCU
5444-A2-Disk, 4.9 MB
5203-002-200 LPM
Avail. Nov. 15, 1978
Lease for as Low as
$500/Month!!
Carole Solano

370
138 & 148
Needed
Buying Rental Credit
Machines Now
(3) 145's Available
Last Quarter
Prices Are
Attractive

3275-002
7821,
4630, 4631, 4633
Available Immediately
Dottie Anderson

CMI CORPORATION
The IBM Specialists
Since 1969

Top of Troy, Suite 1900, W. Big Beaver & I-75, Troy, Michigan 48084 (313) 362-1000

IN CANADA CALL:
Don Dupuis • Windsor, Ont. • (519) 258-8910 / Jacques Dagenais • Montreal, Que • (514) 374-5920

WHEN YOU NEED DEC...

PDP11/03 SYSTEMS

TERMINALS

LSI/11 MODULES

WORD PROCESSORS

Demand. . .Delivery
Demand. . .Discounts
Demand. . .UNITRONIX
for a complete selection of the latest microcomputer products from Digital Equipment Corp.

UNITRONIX CORPORATION
198 Route 206
Somerville, N.J. 08876
(201) 874-8500 TELEX: 833184

SALE OR LEASE

3 2/8 11 1-NOW 1-1/15/79
327 2/7 NOW 10-4633
3288 2-NOW
3340 NOW A2-B2

SYSCOMP
(612) 474-8873

ATTENTION SYSTEM III USERS! Former System III sight has following equipment for sale: 1 CFI Memory Halt Alert, 1 Arco Electric Roto-phase Generator 5 hp, 30 5440 Diskpacks. Contact Scott Zeller, Sybra, Inc., P.O. Box 7, Grand Blanc, MI (313) 694-1222.

For Sale By Owner

INTERDATA 7-32
384 KB
3 - 67MB Discs
1 - 9 Track Tape
1 - 600 LPM Printer
Box Replies to
CW Box No. 1773
797 Washington St.
Newton, Mass. 02160

370/145 IBM MEMORY

For Sale or Lease

H2 to I2

Call Dick Baker
(305) 561-5207

dataware
[illegible]
[illegible]
[illegible]

---

dataserv

COMPUTER MARKET PLACE™

370 CPUs MEMORY 115-138
STEVE LACNY

370 CPUs MEMORY 145-148
TOM HAWKINS

370 CPUs MEMORY 155-158
DAVE MILLER

DISK 3330-40
TOM ANDERSON

TAPE 3410-20
CLIFF WALKER

COMMUNICATIONS 3272-77
TOM ANDERSON

370 READERS PUNCHES PRINTERS
CLIFF WALKER

CPUs MEMORY PERIPHERALS 360
NEAL JOHNSON

MICR 1419
DAVE DODGE

CPU SYSTEMS MEMORY SYS/3
MODELS 6-15

SYSTEM/ 32-34
MARY CRONAN

DATA ENTRY 3741-42
BECKY ERNST

Call Toll Free
800/328-2406
or 612/544-0335
(213) 992-4744

dataserv equipment inc.
9901 Wayzata Blvd. P.O. Box 9488
Minneapolis, Minn. 55440

INVITATION FOR BID

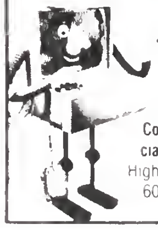
Sealed bids (in triplicate) will be received by the Milwaukee County Federated Library System Board, 814 W. Wisconsin Avenue, Milwaukee, WI 53233 for the acquisition of a computer system to convert from an existing shared computer system (IBM 370/145).

Sealed bids (not to exceed $370,000) are due no later than December 15, 1978, 1:00 p.m., CST. The bids will be opened and publicly read on December 15, 1978 at 2:00 p.m., CST, in the office of the Director, Milwaukee County Federated Library System in the Headquarters Library.

Detailed bid specifications may be obtained from the Milwaukee County Federated Library System, Headquarters Library, 814 W. Wisconsin Ave., Milwaukee, WI 53233, or by calling (414) 278-3210.

Love me — Love my used computer

A thought about used computers presented by CDA, Computer Dealers Association, an international nonprofit trade association dedicated to promoting the advantages of used computers. For a membership roster and copy of our code of ethics, write to



Mr. Marvin Lurie,
Executive Director,
Computer Dealers Association, 6650 Northwest Highway Chicago Illinois 60631 (312) 763-7350

Before you buy or sell used computer equipment consult

COMPUTER PRICE GUIDE

"The Blue Book of Used Computers"

Quarterly publication contains current price information about used IBM computers and peripherals. Includes newsletter about current price trends and availabilities.

$5 per issue — $18 annual subscription

Computer Merchants inc
75 South Greeley Avenue Chappaqua New York 10514
Member Computer Dealers Association (914) 238-9631

BUY • SELL • LEASE • TRADE

SYSTEM/3 370/115 370/125

ECONOCOM

ECONOCOM
1755 LYNNFIELD ROAD
P.O. BOX 17825
MEMPHIS TENNESSEE 38117
901-767-9130

[illegible]

BUY SELL LEASE

370, 360, 1401 & 1440
SYSTEMS & PERIPHERALS

PURCHASE/LEASEBACK

029, 129, 3741, 3742, 3540, 3803, 3420, 3340's

IBM UNIT RECORD EQUIPMENT

026, 082, 083, 084, 085, 087, 088, 402, 407, 514, 519, 548, 552, 557, 029-059-129

Call us for all your needs; we buy rent and sell all types of IBM unit record equipment. Over 12 years of serving commercial and government requirements. Contact ACS for proposal.

ACS EQUIPMENT CORP.
7126 Mullins
Houston TX 77081
(713) 666-2122
TWX 910-881-1526

For Sale or Lease

370/135

Wanted

3344 B2

Corporate Computers, Inc
115 Mason Street
Greenwich, Conn 06830
(203) 661 1500
Member Computer Dealers Association

3350's

All models available
Sale or lease
Avail. from inventory
Call Ed Joseph
for our quote

IPS Computer Mktg
2460 Lemoine Ave.
Fort Lee, N.J. 07024
(201) 947-4200

3270's

Now available
Terminals,
Control Units,
Printers

FORSYTHE McARTHUR ASSOCIATES INC.
919 North Michigan Ave., Chicago, Ill.
(312) 943-3770 (Chi.), (404) 586-0370 (Atl.)
(212) 283-7800 (N.Y.), (214) 748-4690 (Dallas)

FOR LEASE

Immediate Delivery

1 X 20
IBM 3277 with 3272
Local Controller

Bluebonnet Computer Co.
(512) 476-9362

FOR SALE OR LEASE

SYSTEM 34

AVAILABLE IMMEDIATELY!

METROPLEX COMPUTER COMPANY, INC.
7135 John Carpenter Freeway
P. O. Box 47220, Dallas, Texas 75247
(214) 634-2750
TWX 910-861-4171

What you need...
...right now...
... at reasonable prices!

IBM Processors and Peripherals

3031	3032	3155	3158
2 MEG	4 MEG	2 MEG	U34
Lease only	Lease only	DAT	Sale, Lease
June '79	Jan. '79	NOW	Jan. '79
3165	**3168**	**3350**	**3420**
4 MEG DAT	5 MEG	All models	All models
Sale, Lease	Sale, Lease	Sale, Lease	Sale, Lease, Trade
Jan. '79	Jan. '79	Trade	NOW

Your First Choice in the Second Market

Atlanta 404/256-5956
Connecticut 203/853-6966
Fort Worth 817/534-1774
Minneapolis 612/854-8107

COMDISCO®

New Jersey 201/568-9666
Paris, France 374-1130
San Francisco 415/944-1111
Toronto, Ont. 416/498-7220

9701 W. Higgins Rd., Rosemont, Ill. 60018 (312)698-3000

Member Computer Dealers Assn.

MUST SUB-LEASE
370/158

Call for 1-5 year rates
Available Feb.
Tom Robbins — Computer Properties, Inc.

(612) 831-6088 5200 West 73rd St
Minneapolis, Minnesota 55435
Member Computer Dealers Assn.

MEMORY REPAIRS

Six years of successful operation. 1-2 weeks turnaround Work guaranteed Reasonable rates Quotes before starting.

Modern facilities
Stress testing.
All manufacturers cards and systems.

CUSTOM MEMORY

Design and manufacturing
ADD ON MEMORY SYSTEMS
For any application
DIGITAL DATA SYSTEMS, INC
1396 N.W. 65th Terrace
Plantation, Fla 33313
(305) 792-3290

AVAILABLE IMMEDIATELY

370/155J or K — Undatted
370/155J or K — Datted
370/155 Memory (IBM-AMS-CMI-Ampex)

Please contact:
Harry E. Blair 713-524-8249

370/155

DAT, 1MB IBM MEMORY

1 Year, Walk-away Lease

Available in December

CIS
CIS Corp
600 MONY Plaza
Syracuse, NY 13202
315-425 1900
Telex: 93-7435

For Sale
HONEYWELL H6640

- 196,608 words of memory
- IOM expansion
- Integrated unit record processor
- Systems control center
- Motor generator and control unit
- Integrated mass storage processor
- Additional non-simultaneous switched channel
- Device adapter for MSU-0400/MSU0450
- Addressing capability for (4) MSU0400/MSU0450

I/O - INCLUDED

7 - Removable disc unit (117 megabyte)
1 - Dual simultaneous channel
2 - Dual channel device addressing
7 - Dual access feature
1 - Magnetic tape process
1 - Dual simultaneous channel
2 - Addressing capability
6 - Dual density 800 - 1600 BPI 9-track tapes
6 - Magnetic tape drives 125 IPS
2 - NR21-7-track 556/800 BPI option
2 - Magnetic tape drives (100KC)
1 - Punch adapter
1 - Card punch 100 - 400 CPU
2 - Printer adapter
2 - 400/600/6000 character set belt
2 - Belt printer 1600 LPM/136PP
1 - Reader adapter
1 - Card reader 1050 CPM
1 - Datanet 6600 front end with 49,152 byte memory
1 - Speed adapter asyn
1 - Asyn speed adapter

Price — $1,000,000 complete
(available 12/31/78)
CONTACT:
Dave Rubin
215-265-7600,
Ext. 339

WANTED

370 PROCESSORS
3211/3811
3803/3420
3830/3333/3330
3340/3344/3350

Paul Dutton
Tom Farley
TWX 910-861-4134

Lacy Goostree
Tom Norris
214-631-5647

transdata

P O Box 47762 Dallas Texas 75247 PHONE (214) 631-5647

When you plan to BUY or SELL your computer equipment…

Go Greyhound.

WANT TO BUY:

370/138, 370/148, 370/158

For complete information call the Greyhound Representative in your area.

United States		
Phoenix (Home Office)	T A Takash	(602) 248-6037
New York	Dick Ventola	(212) 832-2622
Chicago	Pete Ahern	(312) 298-3910
Dallas	M W "Bill" Tucker	(214) 233-1818
San Francisco	Henry Paulson	(415) 283-8980
International		
Canada	Don Maunder (Toronto)	(416) 366-1513
U.K Europe	Joe Gold (Geneva)	41-22-61-27-54
Mexico	Andrés Contreras	(905) 543-6850
Austro-Asia	John Hallmark (Dallas)	(214) 233-1818
Eurasia	Don Haworth (Dallas)	(214) 233-1818
Non-IBM		
Dallas	John Hallmark	(214) 233-1818

GREYHOUND
COMPUTER CORPORATION
GREYHOUND TOWER, PHOENIX, ARIZONA 85077

IPS 201-947-4200

AVAILABLE SALE OR LEASE

370/158

- 30 DAY DELIVERY
- WILL CONFIGURE TO SPEC
- ATTACHED PROCESSOR AND ALL FEATURES AVAILABLE

CALL JEFF KLEIN OR DICK ABSHER

IPS Computer Marketing Corp., 2460 Lemoine Avenue Fort Lee N.J. 07024
Telephone: (201) 947-4200 Telex: 135144

DEC

HARDWARE

PDP11 • PDP8
LSI-11's
Processors Peripherals Memories
VT52's **LA36**'s
LS120's **LA180**'s
VT100's and **VT132**'s

JARLABE DATA
SALES CORP.
800/645-7234
In N.Y. (516) 822-1235

FOR SALE

DG NOVA 3/12 SYSTEM

64K Byte Memory
Dual Diskette Subsystem
10 MB Disc Subsystem
9 Track 800 BPI Mag Tape Subsystem

DG MICRONOVA SYSTEM

Two systems in one cabinet, each including
64K Byte Memory
Dual Diskette Subsystem
Multi-terminal Communications Software

All equipment maintained by DG and in excellent condition.

CALL - MIKE KLEIN
(201) 654-4000

T.I. Model 745

Portable Terminals

1-4	$1550.00 ea.
5-9	$1525.00 ea.
10 & Up	$1500.00 ea.

Immediate Delivery
Additional Discount
If shipped C.O.D.
Terms 1%-10, Net 30

Call (312) 627-0100
Data Collection Systems, Inc.

BUYING, SELLING, LEASING OR TRADING IBM EQUIPMENT? THEN CALL US FIRST…

CSI COMPUTER SALES INTERNATIONAL, INC.
901 Office Park Plaza Oklahoma City, Ok 73105 405-840-1911
Houston, Tex 713-444-0246
St Louis Mo 314-727-7010

3277-2 SCREENS
WITH
4633 BOARDS

Available Immediately

Lincoln-Parry Systems
Computer Brokers
(416) 444-3601
Telex 06-966637

BUY – SELL – LEASE – BROKERAGE

Let the "NATIONS LARGEST WHOLESALE DEALER"

Buy, sell, lease, sub-lease, or be your agent in placement of your pre-owned IBM 360/370/System 3, or other units

COMPUTER INTERNATIONAL, LTD.
CWC's international division —
experts in foreign markets, freight, customs
BEACH COMPUTER CORPORATION, CWC's Leasing Division
COMPUTER WHOLESALE CORP., (504) 581-7741
SUITE 507/508 FIRST NATIONAL BANK OF COMMERCE BLDG.
NEW ORLEANS, LOUISIANA 70112
MEMBER OF COMPUTER DEALERS ASSOCIATION

SPECIALISTS IN PERIPHERAL EQUIPMENT AND SYSTEM/3's

BUY—SELL—LEASE—TRADE SYSTEM/3

3211/3811 3330/3333 3350/3830 3420/3803 3741/3742
3272/3277 3340/3344 3410/3411 3505/3525

Before you send any of the above machines back to IBM call us — We'll show you how to make money using your rental credits.

WANT TO BUY System/3 Model 15 3270 CRT's Printers/Controllers

CDB FINANCIAL, INC.

Call or Write 8035 E RL. Thornton Frwy. Suite No. 309
Dallas, Texas 75228
214–324–3491

370/158's Wanted to Buy

Call Pat Baker
312-698-3000
or your nearest
COMDISCO®
office

BUY-SELL-LEASE

Save 10% to 50%
on your mini needs.

THIS MONTH'S SPECIAL

DEC FLOPPY SUBSYSTEM	$3295
Shugart SA800	479
SA400 mini floppy	285
CDL-11 Async intf	439
PDP11/35 w/16k	6000
LSI Disc Controller	1899
Centronics 779	999
Centronics 700	1495
ASR-33	700
Selectric	299
10MB Pertec	4250
PDP-11 03	1550
CRT ADM-1A w/c	770
Verbatim Diskettes, 8"	4 50
16K RAM Chips	10 50

COMPUTER INTERFACE TECHNOLOGY

HOTLINE (714) 979-9920
2080 South Grand
Santa Ana, California 92705
Broker • Distributor • Manufacturer

FOR
SALE or LEASE

3420-6 tapes
3420-7 tapes
1442-N2 card punch

AVAILABLE NOW!!

NF COMPUTER SALES & LEASING CORP.
1211 W 22nd St. Suite 616 Oak Brook Illinois 60521
Telephone 312-920-6161 Telex 206106 NFC OAKR

BROKER IN DEC COMPUTER SYSTEMS AND COMPONENTS

C.D. SMITH
730 N. Post Oak Road
# 301
Houston, Texas 77024
(713) 686-9405

TIGER COMPUTER
415 MADISON AVENUE
NEW YORK, NEW YORK 10017
(212) 532-1500 Contact: T.J. McArdle

A TIGER INTERNATIONAL
COMPANY

SHORT AND LONG TERM STRAIGHT WALK-AWAY LEASES

THAT'S RIGHT!

Tiger does not require our customers to guarantee any residual value or find qualified sub leases at the end of the initial term on the equipment.

370/138, 148, 135, 145, 125
370/158's 168's and Peripherals
IBM Series-3031-3032-3033

WE BUY/SELL & SUBLEASE
ALL IBM 370 CPU's & I/O

370/148
Available
For Lease
February 15, 1979

AVAILABLE
Sub-Lease
January 30, 1979
370/138 J
Term - 1 or 2 years

IBM 3032
Model 4

3033-U8
Available
for Lease
April 1, 1979

WANT TO BUY
370/138's
December - February
Availability

WANT TO BUY
370/148's
December - February
Availability

FOR LEASE

3148 - K

With 4660, 2152, 6111,
8100, 8075 and 3047
With 3047 Power Unit
Term 24-48 Months
Available February 1979

145 - IH2

With 4660, 6982, 7855,
8810, 3047 and 3215
Plus 768K OEM Memory
Term 12-36 Months
Available November 1978

Van Arnem Company
1520 North Woodward Ave.
Bloomfield Hills, MI 48013
Larry Van Tuyl
313/647-3040

FOR SALE

360/65 with one or two
megs Fabritek memory
370/158A34, 1433, 1434, 1435
7730, 7731, with or without 3052, 3056 and
3 megs CDC memory

CENTRON COMPUTER CORP
612-884-3366

STATE OF CALIFORNIA

HEALTH AND
WELFARE AGENCY
DATA CENTER

Vendors interested in responding to a forthcoming Invitation For Bid (IFB) for an IBM software compatible CPU, channels, and memory substantially equivalent to an Amdahl 470 V/5, IBM 3032, or ITEL AS/6 for installation between July and September 1979 are asked to contact in writing the:

State of California
Health and Welfare
Agency Data Center
915 Capitol Mall - Rm 235
Sacramento CA 95814

MINICOMPUTERS & SYSTEMS

INVENTORY CLEARANCE

PDP 11/04's w/16K, KY11,D111W	List $7,475 Ours	$5,300
DG 32K MOS Memory for Nova 3	List $5,400 Ours	$2,400
Compatible Tape and Disc Systems	From	$3,200
DEC Station 78's (includes software)	List $7,995 Ours	$6,300
DG 8K Eclipse CORE Memory	Ours	$650

NEW & USED DEC & DG EQUIPMENT IMMEDIATE DELIVERY

SELLERS - Free evaluation of your equipment for sale. List with us at no obligation.

MINICOMPUTER EXCHANGE, INC.
(408) 733-4400 — TWX 910-339-9272

FORSYTHE/McARTHUR ASSOCIATES INC
919 N. Michigan Ave.,
Chicago, IL 60611

AVAILABLE

370/158 Upgrade
U34 to U36
March, 1979

Call
FORSYTHE McARTHUR
(312) 943-3770
Dealer & Lessor in IBM Computers

---

dearborn giveth

370/145I2 available immediately

2001, 4660, 2150, 6111, 6982, 6983, 6984, 7855, 8810, 3047-1 & 3215-1

370/145I2 available immediately

2001, 4660, 6982, 8810, 3047-1, 3215-1

In the U.S., call **Bob Neumeyer at 312/827-9200**

3420-3, 3420-5, 3420-7 with controls; single & dual density; will short term lease; available immediately.

In the U.S., call **Tom Millunchick at 312/827-9200**
In Canada, call **Bill Downey at 416/621-7060**

dc dearborn computer company | dealer - IBM computers systems software leasing

1460 renaissance dr., park ridge, ill. 60068 (chicago) 312/827-9200
toronto (416) 621 7060 • st louis (314) 727 7277 • houston (713) 965 0788

BUY SELL LEASE

PURCHASE - LEASE BACK

370 PERIPHERALS
360 SYSTEMS
SYSTEM 3's

All Unit Record
DAC Buys Rental Credit Equipment
Call or Write

DATA AUTOMATION COMPANY, INC.

4858 Cash Road
Dallas, Texas 75247
214 637-6570
Member of Computer Dealer Association

RSTS/E PAYROLL

Complete Payroll System

- MTD, QTD, and YTD totals for hours, earnings, taxes, and deductions
- Unlimited deductions and distributions per employee
- 14 system defined and 6 user defined deduction calculations
- Piece work, direct labor, job costing, and G/L wage distribution
- Complete array of comprehensive payroll reports
- Most comprehensive payroll system available to RSTS/E users

Contact Cheri Vetter

Bloodstock Computer Services
1750 Alexandria Drive,
P.O. Box 11277
Lexington, Ky. 40511
(606) 278-5440

BUYING SELLING LEASING
360/40 360/50 360/65
370/135 370/138
370/145 370/148
370/155 370/158
370/165 370/168
TAPES / DISKS / CORE
Pioneer Computer Marketing
1165 Empire Central Place Dallas, Texas 75247
214/630-6700

158

SHORT-TERM LEASES — PURCHASE
MANY SIZES AND OPTIONS
DELIVERIES — IMMEDIATE & FUTURE

AMERICAN USED COMPUTER · 617-261-1100
P.O. BOX 68, KENMORE STATION, BOSTON, MASSACHUSETTS 02215

IBM EQUIPMENT

Available 370/138/1

Available 370/135

Available 2314/1

Wanted 158/U34

FORSYTHE McARTHUR
212-283-7800 NEW YORK
404-586-0370 ATLANTA
214-748-4690 DALLAS

(312) 943-3770

FORSYTHE McARTHUR ASSOCIATES, INC.
919 NORTH MICHIGAN AVENUE CHICAGO ILLINOIS 60611

---

adtec

3742-1

dual data stations
280 Madison Ave.
New York, NY 10016
(212) 532 7590

3270'S FOR SALE

By End User

5 3277 Mod. 2 plus 1 3272 with device adapters. Available Dec. 15.

Call (405) 755-1600 ext. 209.
Robert Heare
Fife Corporation

IBM 360 MEMORY
For Sale or Lease

Data Recall 360/30 64K to 96K
IBM 360/40 G to H and GF to H
SMI 360/40 256K to 384K
IBM 360/50 H to I and HG to I
SMI 360/50 256K to 768K
SMI 360/50 512K to 1 Megabyte
IBM 2365-13's for 65MP

Call Dick Baker
(305) 561-5207

dataware inc
3000 NE 30th Place, Suite 309
Fort Lauderdale Florida 33306
Telephone (305) 561-5207
Member Computer Dealers Association

3272 3741
3277 3742
3286 129's

BUY-SELL-LEASE-TRADE
JIM CARLETON

IBM 138
SALE or LEASE
JOHN MILLS

NATIONAL COMPUTER
EQUIPMENT CORP.
25614 Jefferson
St. Clair Shores, MI 48081
(313) 774-7400

3270's
Now available
Terminals,
Control Units, Printers

COMDISCO®
call (312) 698-3000
or your nearest Comdisco office

FOR SALE

Documation I/O
6501 Card Reader
6520 Card Punch
2250-2 Printer
STC
2x5 Super Disk
4x32 6250 Tape
IBM
3420-7 S.D.
3420-3 S.D.
3420-7 D.D.

Call or Write
714/833-9800
TWX 910-595-2550
SADDLEBACK MARKETING CORPORATION
1400 No. Bristol, Ste. 170
Newport Beach, CA 92660

FOR SALE OR LEASE

DISK PACKS

INITIALIZED/CERTIFIED

2315S 2316S
5440S
7905S 1316S
3336S, Mods. I, II
3348S, Mod. 70

METROPLEX COMPUTER COMPANY, INC.
MCC
7135 John Carpenter Freeway
P O Box 47220 Dallas Texas 75247
(214) 634-2750

FOR SALE

360/65 Fabri-Tek Memory
Any Size-
Any Configuration
Up to 2 Megabytes
one Megabyte per Box

Call BOB MILLER
612/884-1020
D P LEASING INC

FOR SALE OR LEASE

370/168

January '79
Bob VanHellemont
CMI CORPORATION — (313) 362-1000

WANT TO TRADE

OUR 158 OR 155 DAT

FOR 148-K

THOMAS NATIONWIDE COMPUTER CORPORATION

Brian M. Battle — (312) 944-1401
600 North McClurg Court — Suite 4202A
Chicago, Illinois 60611

Paul Nortman — (516) 752-1000
1 Huntington Quadrangle - Suite 4S13
Huntington Station, New York 11746

IDS

New/Used DEC Systems

11-34
- 10 M Byte RL11/RL01 Disk Subsystems
- 16KW to 128KW MOS Memory
- DZ-11 (8 or 16 Line) Communication Interface

LSI-11
- Custom Enclosures/8 Slot Backplanes
- Sync/Async Programmable Line Interfaces
- Direct Memory Foundation Modules

(415) 969-7222

453-D Ravendale Drive
Mountain View Ca. 94043

SYSTEM/34s

AVAILABLE '78, '79

- ALL MODELS, INCL. 128MB DISK (E35)
- S/34 DISPLAYS IN STOCK

IBM/GSD

LEASING SPECIALISTS

- SYSTEM/3
- SYSTEM/34
- SERIES/1
- ETC.

DATALEASE CORPORATION

283 Greenwich Ave.
Greenwich, Ct. 06830
(203) 869-1152

SALE/OWNER MAKE OFFER
1403-N1 2821-1
WITH VSC 2540
ALSO
COGNITRONICS SYSTEM 70 OPTICAL SCANNER
$25,000 OR BEST OFFER.

Call (312) 639-2351
LYNCH DATA PROCESSING
Cary, IL. 60013

FOR SALE
System 3/15

Immediate Delivery
C22
or reconfigurated
to your needs

CDB FINANCIAL, INC.
8035 East R.L. Thornton Fwy.
Suite 309, Dallas, TX 75228
(214) 324-3491

FOR SALE
DATA GENERAL NOVA 1200

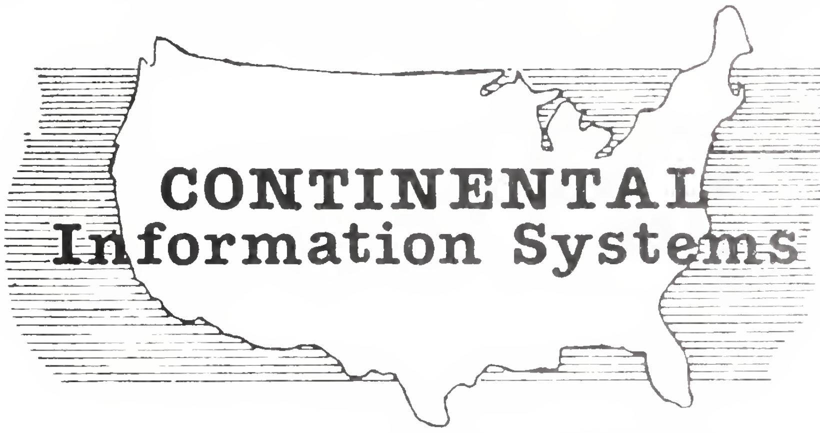
With 32K words	$3500
1-ADM 1-A CRT	900
1-TTY Model 33ASR	200
1-Mohawk card Reader M-6002	900
1 each IBM 026, 056 both ...	300

All plus shipping
20% discount for All

H.D.S., Inc.
2810 Glenda Ave.
Fort Worth, TX 76117
Nancy Webster
(817) 831-0761

FOR SALE
IBM 3277-2 CRT's
All Keyboards
IBM 3286-2 Printers

REM COMPUTERS
63 Strickland St.,
Bay Head, N.J.
201-892-7560



CONTINENTAL Information Systems

BUY, SELL, LEASE, SUBLEASE, AND TRADE
NEW AND PRE-OWNED IBM EQUIPMENT

AVAILABLE

MODEL	QNTY	AVAILABLE	MODEL	QNTY	AVAILABLE
1442 N1	1	Now	3277-2/4633	3	Now
1442 N2	1	Now	3284-2	1	Now
2312	1	Now	3286-2	4	Now
2313	2	Now	3288-2	1	Now
2314	1	Now	3330-1	4	Now
2401-2	4	Now	3330-11	3	Now
2402-2	2	Now	3333-1	1	Now
2403-2	1	Now	3333-11	2	Now
2501 B1	1	Now	3340 A2	2	Now
2501 B2	1	Now	3344 B2	1	Now
2540-1	1	Now	3420-3/6631	10	Now
2803-1	1	Now	3420-5/6631	4	Now
2821-1	1	Now	3420-6/6425	5	Now
2821-2	2	Now	3420-7/3550	3	Now
3203-2	1	Now	3505 B1	1	Now
3271-1	1	Now	3525 P2	1	Now
3271-2	8	Now	3803-1	1	Now
3277-2/4630	4	1/15/79	3830-2	2	Now
			3830-2/Madrids	1	Now

Peripherals and I/O

All 360/370 Disk, Tape
Printers, Readers, and T/P

Gene Chappell
Wanted:
3330's, 3340's & 3420's

Call Us!

CIS Corp
600 MONY Plaza
Syracuse NY 13202
315-425-1900

CIS is very interested in buying pre owned IBM 370 systems. If you are thinking about selling, let us make you an offer

---

WANTED!
ALL
NCR
MINICOMPUTER EQUIPMENT

SMITH ANDERSON CORP.
68-757 SUMMIT DR.
CATHEDRAL CITY, CA 92234
(714) 346-3227

FOR SALE

2 IBM 2972-8 Control Units 12 IBM 2980-4 On Line Teller Terminals 2 IBM 2980-2 Teller Terminals Under Maintenance Agreement. Also various lengths of cable for 2980s

V.J. Musselman
Clyde Savings, 7222 W. Cermak
North Riverside, Illinois
(312) 442-6700

FOR SALE OR LEASE
370/145
100 CPU

SERIAL 10716
Available 10/1/1978

THE AMERICAN
COMPUTER &
FINANCIAL CORP
17 E. Orange St
Chagrin Falls, OH 44022
(216) 247-3232

DEC
PDP8 ● PDP11
HARDWARE

Processors	Peripherals
Disks	Tapes
Memories	Terminals

Reasonably Priced
Quick Deliveries
Fully Warranteed
Call

BROOKVALE ASSOCIATES
(516) 585-0800

FOR SALE
IBM SYSTEM/32

9.1 MEGABYTE DISK, 155 LPM PRINTER, 16K MAIN STORAGE, 48 CHARACTER PRINT BELT

AVAILABLE
JANUARY 1, 1979

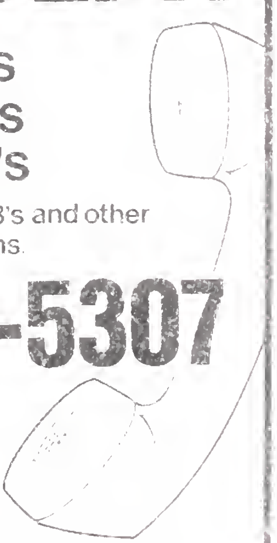
PHONE: (614) 274-1127
COLUMBUS, OHIO

FOR SALE OR LEASE
370/155 with DAT

2MB — OEM Memory
Serial No. 10482
AVAILABLE 1/2/79
Call Anne Rhame For Details
(804) 643-4200

COMMONWEALTH COMPUTER ADVISERS INC

Short or Long Term Leases From RANDOLPH



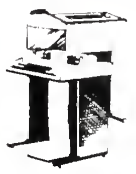
3031's
3032's
3033's

...as well as 138's, 148's and other CPU's and full systems.

800-243-5307

Randolph Computer Company
537 Steamboat Rd., Greenwich, CT 06830
(203) 661-4200

IMMEDIATE DELIVERY
Domestic & Export
DEC LSI - 11 COMPONENTS
A full and complete line with software support available.



Mini Computer Suppliers, Inc.
25 CHATHAM ROAD
SUMMIT, NEW JERSEY 07901
SINCE 1973

(201) 277-6150 Telex 13-6476

BUY SELL

3277-02 Display Stations
All Keyboards
3284-02 Printers
3286-02 Printers
3271-02 Control Units
3272-02 Control Units
30-60 Day Delivery

Contact: John Redfern

179 Lyons Plain Rd.
Weston, Conn. 06883
(203) 227-5151

TIME & SERVICES

WE ARE
BROKERS OF COMPUTER TIME
N.Y. N.J., & CONN Only
Computer Reserves, Inc
(212) 687-1840
(201) 676-1881

370/158 mod 3 Datacenter
5.0 meg MVS
Specializing in
Remote Job Entry
TSO, CICS, and Batch
IBM 3800 Laser Printer
Very Attractive Rates
Contact: Stu Kerievsky
(212) 564-3030
Datamor
132 West 31 St
New York, N.Y. 10001

CORE MEMORY REPAIR
Ampex, Burroughs, CAI, CMI, Data Craft, Data General, CDC, DEC, EMM, Fabri Tek, Honeywell, GAI, HP, Interdata, Lockheed, Plessey, NCR, SMI, Univac, Microdata, Varian, XDS
Any Manufacturer's Memory
THREE DELTA CORP
1038 Kiel Ct
Sunnyvale, CA 94086
(408) 734-2680

COMPUTER TIME
COMPANY IN
SOUTHERN CALIFORNIA
360/30
360/40
360/50
ALL SHIFTS AVAILABLE

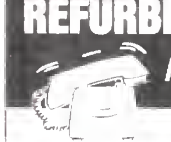
CALL Bill Brunskill
(714) 557-3671

DATA CENTER LOCATED AT

633 YOUNG STREET
SANTA ANA, CA 92705

COMPUTER POWER AVAILABLE
AMDAHL 470
MVS/TSO/CICS/SPM/RJE/SDLC
3330/3350/3420-8/3270/3700
Complete Remote Datacenter — All Shifts — Technical Support

Network Computing Corp.
5301 77 Center Dr. ST. 40
Charlotte, N.C. 28210
704/525-8810

800 423-5321
REPAIR & REFURBISHMENT HOTLINE


DEC — NOVA USERS
MEMORY REPAIRS
PDP 8 — PDP 11 — PDP 10 — NOVA
Core and Semi-conductor
Many compatible memories —
Ampex — Plessey — Mostek

MODULE REPAIR
11/03, 11/04, 11/05 11/10,
11/34 11/35, 11/40

SELECTED PERIPHERAL MODULE REPAIR
LA 36 — RX01 — Etc

Call Ed O Neal on the
HOTLINE — 800-423-5321
(Outside California)
or CALL — 213-889-6031
(In California)
TWX #910-494-4971

TYMSHARE®
EQUIPMENT SUPPORT DIVISION
(formerly VALCOMP)
31355 West Agoura Rd
Westlake Village, Calif 91361

SOFTWARE FOR SALE

WANTED

Marketing rights for commercial software packages. Packages must be thoroughly proven, professionally documented. Minimum 10 users.

WESTON ASSOC.
313 South St.
Weston, MA. 02193
(617) 891-5000

WANT TO BUY
General Ledger and Accounts Payable Software Packages

Should be writtin in COBOL compatible with NCR CENTURY 151.

General Ledger package should have flexible budgeting capability.

Prefer response from Southeastern U.S. (GA. FLA. ALA.)

Call or Write
Al Dorminy
(912) 924-8001
METALUX CORP.
Box 1207
Americus, GA 31709

ACCOUNTING SOFTWARE FOR DEC RSTS/E OR CTS-500 USERS

From one of the pioneers in commercial data processing using RSTS. Completely on-line, interactive systems available for **ACCOUNTS-PAYABLE, GENERAL-LEDGER, FINANCIAL-REPORTING, ACCOUNTS-RECEIVABLE and PAYROLL applications.**

These are consolidating packages and support multi-division company and multi-company corporate accounting functions.

If you are installing or have installed a Digital Equipment Corporation RSTS E or CTS-500 system, contact us for cost-effective solutions to your core accounting problems.

Plycom Services, Inc

(219) 935-5121
P.O. Box 160
Plymouth, IN 46563

ACCOUNTS PAYABLE
Now a low-cost software package for mini or mainframe computers with many cost-saving features
- Batch processing using single data base for fast processing
- Modularly structured COBOL programs reduces maint. costs
- Multi-company facility avoids duplicate software.
- Flexible retrieval facility for printing reports & more.

For full details on how our APS software can save you time and money, call (415) 254-1264, write:
LEGLER SYSTEMS CO.
23 Charles Hill Rd.
Orinda, CA 94563

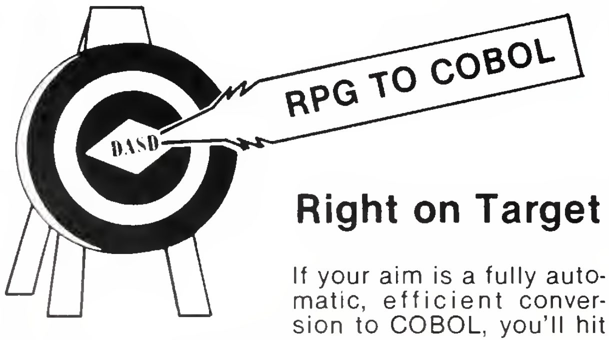
now you can provide
MEDICAL/DENTAL BILLING & INSURANCE
Services to doctors dentists, groups and clinics
ON-LINE Software
- IBM, Datapoint, DEC & HP
- Complete billing and insurance
- Cobol, RPG, Basic
- Service Bureau or In-Clinic
- Over 30 Installations

call or write to
OCS
Occidental Computer Systems, Inc.
6666 Valjean Ave.
Van Nuys, CA 91406
(213) 782-3005

THE SCHEDULER
OS/VS
ON-LINE
- Status Displays
- Add, Update & Memo
- Job Sequence Enforcement
- Backlog Carryover
- Performance Analysis

CHRONETICS
17222 So. Leslie
Cerritos, CA 90701
(213) 926-2805

WORD PROCESSING SOFTWARE
written in DIBOL-11
for DEC CTS-300 users
PDP 11/03, 11/10, 11/34
WAGNER DATA SYSTEMS
1518 NBC Building
San Antonio, TX 78205
[512] 225-1365



Right on Target

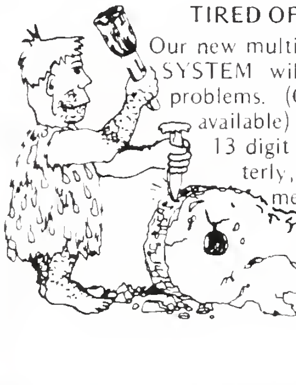
If your aim is a fully automatic, efficient conversion to COBOL, you'll hit the mark with DASD's RPG/RPG II to ANS COBOL (DOS or OS) Translator. Translator produced COBOL programs are easy to read and maintain. Conversion is accomplished with significant savings in time and money.

Several service options are available: Program Conversion, Program Conversion and Clean Compile, Conversion with DASD Support and Turnkey Conversion.

DASD Corporation encourages test evaluations of the RPG to COBOL Translator. Ask your DASD Representative for details.

DASD CORPORATION

DASD CORPORATION
Corporate Services Center
9045 N. Deerwood Drive
Milwaukee, WI 53209
414/355-3405
Dept. C



TIRED OF REINVENTING THE WHEEL?

Our new multicompany FINANCIAL REPORTING SYSTEM will help end your general accounting problems. (Compatible A/P and other systems available)

13 digit Acct. #, Budgets, Comparative, Quarterly, Allocations, Consolidations, Departments, Billion $ amts., Recurring entries, Change in financial position.

BANCROFT COMPUTER SYSTEMS, INC.
P.O. Box 1533, W. Monroe, LA 71291
(318) 388-2236

IS YOUR TIME VALUABLE?
WE CAN REDUCE YOUR SOFTWARE DEVELOPMENT TIME!

Software Available For Interactive Systems
- Engineering Applications
- Health Care Patient Accounting
- Manufacturing Controls
- Municipal and Utility Billing
- Oil and Gas Accounting
- Professional Time and Billing
- Wholesale and Retail Accounting

All Applications Available:
- A/R, A/P, G/L, Payroll
- Job Cost
- Inventory
- Financial Reporting

For Information and Prices Write or Call Today:
F.N. KAUTZMANN
& ASSOC., INC.
1022 Wirt Rd., Suite 308
Houston, TX 77055
(713) 688-1101

RPG/RPG II to PL/1

Dataware's software translator converts RPG and RPG II programs to an optimized PL/1 (DOS or OS). The translator achieves an extremely high percentage of automatic conversion (approaching 100%) of the source code

- **PL/1 to COBOL**
- **EASYCODER/TRAN to COBOL**
- **BAL/ALC to COBOL**
- **AUTOCODER (7070) to COBOL**
- **COBOL to COBOL**
- **AUTOCODER/SPS to COBOL**
- **RPG to COBOL**

For more information on our translators, write or call today

Dataware, Inc.
495 Delaware Street
Tonawanda, N.Y. 14150
(716) 695-1412

DEC PDP-11 APPLICATIONS

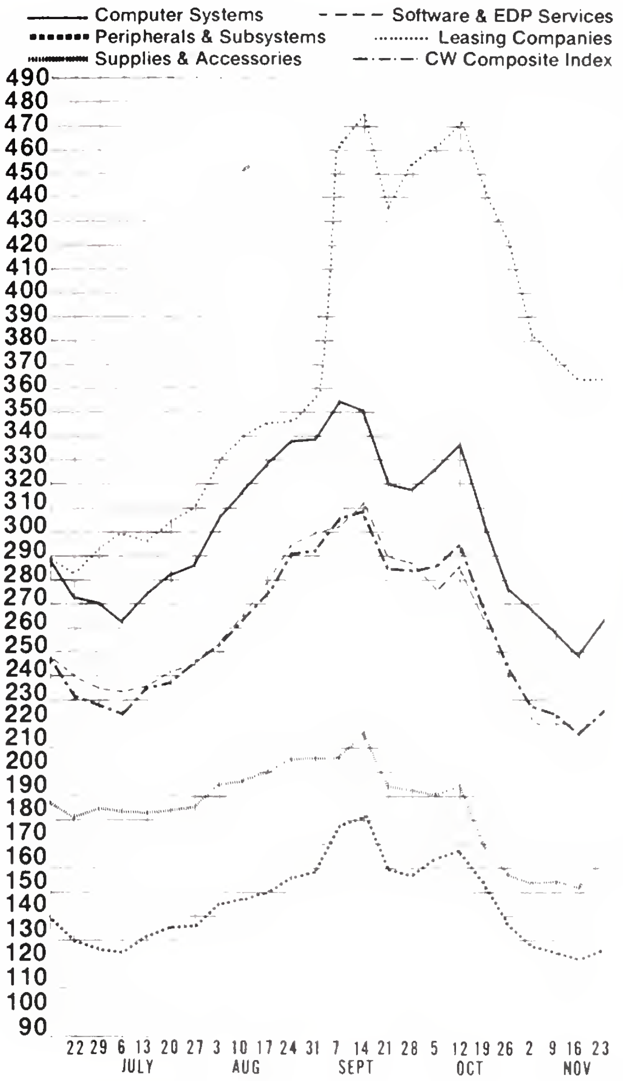
- Accounts Receivable
- Accounts Payable
- General Ledger
- Payroll/Personnel
- Order Processing
- Inventory Control
- Job Shop Scheduling

- Financial Modeling
- Portfolio Management
- Tape Library Management
- Computer Time Accounting

- Basic Plus
- Dual PDP 11/70's

THE RSTS/E APPLICATIONS SPECIALISTS

ims
Interactive Management Systems, Inc.
375 Concord Avenue
Belmont, Mass. 02178 (617)489-3550



Earnings Reports

APPLIED MAGNETICS
Year Ended Sept 30

	1978	1977
Shr Ernd	$1 02	
Revenue	86 320,000	$66,761,000
Tax Cred	1,075,000	
Earnings	4,425,000	(3,589 000)
3 Mo Shr	42	
Revenue	24 018,000	18 411,000
Tax Cred	487,000	
Earnings	1,879,000	(1 000)

COMPUTERIZED AUTO REP
Three Months Ended Sept 30

	1978	1977
Shr Ernd	$ 16	$ 18
Revenue	3 578,000	a3,102,000
Earnings	252,000	281 000
9 Mo Shr	48	56
Revenue	10 389,000	a9,107,000
Earnings	760 000	900,000

a-Restated

DATA CARD
Three Months Ended Sept 30

	1978	1977
Shr Ernd	$ 38	$ 22
Revenue	11,138,000	7 878 000
Earnings	1,018,000	568 000
6 Mo Shr	62	32
Revenue	21,039,000	14,182,000
Earnings	1 646,000	829 000

INFOREX
Three Months Ended Sept 30

	1978	1977
Shr Ernd	$ 30	$ 18
Revenue	17,599,000	16,373,000
Tax Cred	131 000	115,000
Earnings	994,000	534 000
9 Mo Shr	67	36
Revenue	50,728 000	45 955,000
Tax Cred	284,000	201 000
Earnings	2,140,000	1,075,000

a-Restated to reflect accounting change for leases

WANG LABS
Three Months Ended Sept 30

	1978	1977
Shr Ernd	$ 30	$ 18
Revenue	55 774,000	36,221,000
Earnings	3,537,000	1,869,000

Computerworld Sales Offices

Vice-President Marketing
Roy Einreinhofer
Advertising Administrator
Jerry Williams
COMPUTERWORLD
797 Washington Street
Newton, Mass. 02160
Phone: (617) 965-5800
Telex: USA 92-2529

Boston
Robert Ziegel
Northern Regional Manager
Chris Lee
Senior Account Manager
Frank Collins
Account Manager
COMPUTERWORLD
797 Washington Street
Newton, Mass. 02160
Phone: (617) 965-5800

New York
Donald E. Fagan
Eastern Regional Manager
Frank Gallo
District Manager
Peter Senft
Account Manager
COMPUTERWORLD
2125 Center Avenue
Fort Lee, N.J. 07024
Phone: (201) 461-2575

Los Angeles
Bill Healey
Western Regional Manager
Jim Richardson
Judy Milford
Account Managers
COMPUTERWORLD
1434 Westwood Boulevard
Los Angeles, Calif. 90024
Phone: (213) 475-8486

San Francisco
Bill Healey
Western Regional Manager
Jim Richardson
Account Manager
Donna Deslauriers
Account Coordinator
COMPUTERWORLD
[illegible] Sacramento Street
Suite 600
San Francisco, Calif. 94111
Phone: (415) 421-7330

Japan
Mr. Seiichiro Takahashi
General Manager
DEMPA COMPUTERWORLD
1-11-15 Higashi Gotanda
Shinagawa-Ku, Tokyo 141
Phone: (03) 445-6101
Telex: J42461

United Kingdom
Tony Vickers
IDG PUBLISHING LTD
140-146 Camden Street
London NW1 9PF
Phone: (01) 267-1201
Telex: UK 261757

West Germany
Hans Juergen Barthelt
CW PUBLIKATIONEN
Friedrichstrasse 31
8000 Munich 40
Phone: (089) 34 90 61
Telex: W. Ger. 5-215350 HKED

Australia
Alan Power
COMPUTERWORLD PTY LTD
3 Bruce Street
Crows Nest, NSW 2065
Phone: 929-5388
Telex: SECCO AA25468

TRADE*QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, NOVEMBER 21, 1978

All statistics compiled computed and formatted by
TRADE QUOTES INC
Cambridge, Mass 02139

COMPUTER SYSTEMS

EXCH		1978 RANGE (1)	CLOSE NOV 21 1978	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	28- 69	46 3/8	+3 3/4	+8.7
N	BURROUGHS CORP	59- 87	70 7/8	+ 7/8	+1.2
O	COMPUTER AUTOMATION	15- 44	17 1/2	+ 1/2	+2.9
N	CONTROL DATA CORP	23- 44	31 7/8	+2 3/8	+8.0
O	CRAY RESEARCH INC	21- 74	27	+3 1/2	+14.8
N	DATA GENERAL CORP	42- 71	58 1/8	+3	+5.4
N	DATAPOINT CORP	34- 75	58	+5	+9.4
N	DIGITAL EQUIPMENT	39- 54	47 3/4	+1 1/8	+2.4
N	ELECTRONIC ASSOC.	2- 13	7 1/8	+ 5/8	+9.6
A	ELECTRONIC ENGINEER.	9- 19	11 1/2	+1 1/8	+10.8
N	FOUR-PHASE SYSTEMS	19- 46	26 1/8	+1 1/8	+4.5
N	FOXBORO	28- 40	32 1/2	+1 1/2	+4.8
O	GENERAL AUTOMATION	7- 26	13 3/4	+1 1/4	+10.0
O	GRI COMPUTER CORP	1- 3	1	0	0.0
N	HEWLETT-PACKARD CO	62- 93	81 3/4	+2 7/8	+3.6
N	HONEYWELL INC	43- 72	63 3/4	+2 3/4	+4.5
N	IBM	236-305	264	+5 1/2	+2.1
O	MANAGEMENT ASSIST	9- 29	16 1/2	+1 1/8	+7.3
O	MANUFACTURING DATA S	9- 23	18 3/4	+1 3/4	+10.2
O	MICRODATA CORP	10- 23	18 1/4	+2 3/4	+17.7
O	MINI-COMPUTER SYST	4- 8	4 3/4	+ 1/2	+11.7
O	MODULAR COMPUTER SYS	7- 17	8 1/2	+1	+13.3
N	NCR	37- 67	58 1/8	+1	+1.7
N	PRIME COMPUTER INC	20- 43	26 7/8	+ 7/8	+3.3
N	PERKIN-ELMER	17- 28	25	+1 1/8	+4.7
N	SPERRY RAND	33- 49	41 1/2	+ 3/4	+1.8
A	SYSTEMS ENG. LABS	11- 24	12 7/8	+ 3/8	+3.0
O	TANDEM COMPUTERS INC	13- 37	26 1/2	+1 3/4	+7.0
A	WANG LABS.	12- 32	23 1/4	+3 1/4	+16.2

LEASING COMPANIES

EXCH		1978 RANGE (1)	CLOSE NOV 21 1978	WEEK NET CHNGE	WEEK PCT CHNGE
O	BOOTHE COURIER CORP	13- 21	17 1/4	0	0.0
O	COMDISCO INC	5- 22	14 1/4	+1 1/2	+11.7
A	COMMERCE GROUP CORP	1- 1	1/4	- 1/8	-33.3
A	COMPUTER INVSTRS GRP	1- 7	2 3/4	- 3/4	-21.4
O	CONTINENTAL INFO SYS	5- 15	6 1/2	+ 1/4	+4.0
M	DATRONIC RENTAL	1- 3	2 1/8	- 1/4	-10.5
A	DCL INC	3- 5	3 1/2	+ 3/8	+12.0
N	DPF INC	8- 14	9 7/8	+ 3/4	+8.2
N	ITEL	16- 36	24 1/4	+2 7/8	+13.4
N	LEASCO CORP	24- 36	32 3/4	+ 7/8	+2.7
O	LEASPAC CORP	1- 4	3	+ 1/2	+20.0
A	PIONEER TEX CORP	3- 7	3	- 3/8	-11.1
N	U.S. LEASING	13- 20	14 1/4	+ 3/8	+2.7

EXCH: N=NEW YORK: A=AMERICAN: P=PHIL-BALT-WASH
L=NATIONAL: M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		1978 RANGE (1)	CLOSE NOV 21 1978	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 2	1	0	0.0
O	ANACOMP INC	8- 22	11 1/2	+ 3/4	+6.9
A	APPLIED DATA RES.	8- 17	9 3/4	+ 3/4	+8.3
N	AUTOMATIC DATA PROC	24- 36	30	0	0.0
O	COLEMAN AMERICAN COS	1- 2	7/8	- 1/8	-12.5
O	COMPU-SERV NETWORK	6- 12	6 1/4	0	0.0
O	COMPUTER HORIZONS	1- 9	5 3/4	+ 1/4	+4.5
O	COMPUTER NETWORK	6- 16	6 3/4	+ 1/4	+3.8
N	COMPUTER SCIENCES	8- 17	11 1/8	+1 1/2	+15.5
O	COMPUTER TASK GROUP	1- 4	4 1/2	+ 3/4	+20.0
O	COMPUTER USAGE	2- 4	2 1/4	+ 1/8	+5.8
O	COMPUT AUTO REP SVC	4- 10	5 7/8	+ 1/4	+4.4
O	COMSHARE	6- 19	13 1/4	+ 3/4	+6.0
O	CULLINANE CORP	14- 33	17	+2 1/4	+15.2
O	DATA DIMENSIONS INC	4- 9	4 5/8	+ 3/8	+8.8
O	DATATAB	1- 2	1	0	0.0
N	ELECTRONIC DATA SYS.	15- 25	17 7/8	- 1/8	-0.6
O	INSYTE CORP	1- 3	1	0	0.0
O	IPS COMPUTER MARKET.	2- 3	3 1/4	0	0.0
O	KEANE ASSOCIATES	3- 6	4 1/2	+ 1/4	+5.8
O	KEYDATA CORP	1- 3	2	+ 1/4	+14.2
A	LOGICON	10- 19	11	+ 3/4	+7.3
A	NATIONAL CSS INC	15- 36	24 1/8	+1 1/4	+5.4
O	NATIONAL DATA CORP	7- 13	8 1/4	+ 1/4	+3.1
A	ON LINE SYSTEMS INC	12- 30	15 3/4	+2	+14.5
N	PLANNING RESEARCH	4- 10	6 1/2	+ 3/4	+13.0
O	PROGRAMMING & SYS	1- 1	1 1/4	0	0.0
O	RAPIDATA INC	3- 7	4 1/8	+ 1/8	+3.1
O	REYNOLDS & REYNOLD	18- 36	29	+2 1/2	+9.4
O	SCIENTIFIC COMPUTERS	3- 9	5 3/4	+ 1/4	+4.5
O	TYMSHARE INC	18- 33	25 1/4	+2 1/4	+9.7
A	URS SYSTEMS	5- 8	6 1/8	+ 1/4	+4.2
N	WYLY CORP	1- 7	3 7/8	+ 1/8	+3.3

PERIPHERALS & SUBSYSTEMS

EXCH		1978 RANGE (1)	CLOSE NOV 21 1978	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	14- 32	22 3/4	+2 1/2	+12.3
O	ADVANCED MEMORY SYS	7- 18	12 1/8	+1 1/2	+14.1
N	AMPEX CORP	10- 19	14 1/2	+1 1/2	+11.5
O	ANDERSON JACOBSON	5- 10	5 5/8	+ 3/8	+7.1
N	APPLIED DIG DATA SYS	9- 22	9 1/4	+ 1/4	+2.7
O	BEEHIVE INT'L	3- 7	3 5/8	+ 7/8	+31.8
A	BOLT,BERANEK & NEW	6- 14	9 5/8	+ 3/8	+4.0
N	BUNKER-RAMO	10- 20	14 7/8	+2 3/4	+22.6
A	CALCOMP	3- 13	6 5/8	- 1/4	-3.6
O	CAMBRIDGE MEMORIES	3- 9	4 3/8	+ 3/4	+20.6
N	CENTRONICS DATA COMP	16- 37	24 1/2	+ 3/8	+1.5
O	COGNITRONICS	1- 4	1 3/4	+ 1/4	+16.6
O	COMPUTER COMMUN.	6- 12	4 5/8	+ 3/4	+19.3
O	COMPUTER CONSOLES	4- 10	7 1/4	+1 1/4	+20.8
A	COMPUTER EQUIPMENT	3- 6	4	+ 1/4	+6.6
O	COMPUTER TRANSCEIVER	1- 3	3	0	0.0
O	COMPUTERVISION CORP	9- 30	20 1/2	- 3/4	-3.5
O	COMTEN	9- 38	12 3/4	-11 3/4	-47.9
N	CONRAC CORP	13- 26	14 3/8	+ 7/8	+6.4
O	DATA ACCESS SYSTEMS	3- 14	12 1/4	- 1/2	-3.9
O	DATA 100	9- 20	19 5/8	+ 1/4	+1.2
A	DATA PRODUCTS CORP	14- 25	16	+1 3/4	+12.2
O	DATUM INC	2- 6	2 1/2	- 1/8	-4.7
O	DECISION DATA COMPUT	2- 6	3 1/8	+ 3/8	+13.6
O	DELTA DATA SYSTEMS	1- 1	3/4	- 7/8	-53.8
A	DOCUMATION INC	6- 34	19 7/8	+2 1/4	+12.7
O	DATARAM CORP	6- 32	20	0	0.0
N	ELECTRONIC M & M	4- 9	4 3/4	+ 1/2	+11.7
O	FABRI-TEK	1- 2	1 1/8	-	-5.3
O	GENERAL COMPUTER SYS	1- 3	1 5/8	+ 1/4	+18.1
O	GENERAL DATACOMM IND	9- 21	10 1/2	0	0.0
N	HAZELTINE CORP	10- 17	11 1/4	+ 7/8	+8.4
N	HARRIS CORP	17- 36	29 5/8	+ 3/8	+1.2
O	INFOREX INC	6- 11	6 3/8	- 1/8	-1.9
O	INFORMATION INTL INC	7- 12	7	- 1/4	-3.4
O	INFOTON	1- 3	2 1/4	0	0.0
O	INTEL CORP	39- 62	49	+3	+6.5
A	LUNDY ELECTRONICS	4- 8	4 3/8	- 1/4	-5.4
O	MSI DATA CORP	10- 19	11 3/4	+ 3/8	+3.2
N	MEMOREX	27- 59	30 7/8	+3	+10.7
N	MOHAWK DATA SCI	6- 15	8 5/8	+1 1/4	+16.9
O	OMEX	2- 6	5 1/2	0	0.0
O	PARADYNE CORP	9- 17	9	+ 1/8	+1.4
O	PENRIL CORP	5- 12	9 1/4	+ 1/8	+1.3
N	PERTEC CORP	9- 17	10 3/4	0	0.0
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	QUANTOR CORP	2- 5	2 5/8	0	0.0
O	RECOGNITION EQUIP	7- 13	8	+ 1/8	+1.5
O	SCAN DATA	1- 5	1 7/8	- 1/8	-6.2
N	STORAGE TECHNOLOGY	19- 46	26 3/8	+2 3/4	+11.6
O	T BAR INC	11- 20	14 1/4	+ 3/4	+5.5
O	TALLY CORP.	4- 9	8	+1 1/4	+18.5
A	TEC INC	6- 13	6 3/4	+ 1/4	+3.8
N	TEKTRONIX INC	33- 50	44 3/4	+2 3/4	+6.5
N	TELEX	3- 9	5 1/4	+ 1/2	+10.5
O	TESDATA SYSTEMS CP	9- 23	9 1/4	- 1/2	-5.1
O	WILTEK INC	1- 2	7/8	- 1/4	-22.2

SUPPLIES & ACCESSORIES

EXCH		1978 RANGE (1)	CLOSE NOV 21 1978	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN BUS PRODS	6- 11	7 5/8	- 3/8	-4.6
O	BALTIMORE BUS FORMS	2- 4	1 1/2	+ 1/2	+50.0
A	BARRY WRIGHT	14- 30	23 5/8	+3 5/8	+18.1
O	CYBERMATICS INC	1- 1	5/8	0	0.0
O	DUPLEX PRODUCTS INC	13- 30	17	+1 1/2	+9.6
N	ENNIS BUS. FORMS	8- 17	10 5/8	- 1/4	-2.2
N	3M COMPANY	43- 66	63 3/8	+2 3/8	+4.0
O	MOORE CORP LTD	26- 34	28 3/4	+ 1/4	+0.8
N	NASHUA CORP	18- 37	23 1/8	+ 3/4	+3.3
O	STANDARD REGISTER	20- 27	22 3/4	+1 1/4	+5.8
A	TAB PRODUCTS CO	8- 16	9 3/4	+ 1/4	+2.6
N	UARCO	19- 47	45 3/4	+8 1/8	+21.0
A	WABASH MAGNETICS	10- 22	14 3/4	+1 1/4	+9.2
N	WALLACE BUS FORMS	18- 33	22 3/4	+1	+4.5

NOT ICED TEA, FRAN. ACCOUNTS PAYABLE.

FRAN TARKENTON, MINNESOTA VIKINGS' QUARTERBACK.

Fran Tarkenton's product isn't iced tea, it's the MSA Accounts Payable System.

The hottest A/P system on the market, MSA Accounts Payable offers users these important benefits:

- Detects duplicate invoices
- Optimizes discounts
- Makes vendor payment recommendations
- Provides for recurring payments
- Projects disbursements for any number of days

In addition, it records use tax dollars and offers a variety of check writing features.

MSA's Accounts Payable System, as well as MSA's other systems, interfaces with MSA's General Ledger System.

For more information about MSA's Accounts Payable System or any of MSA's complete line of financial software systems, call Carole McConnell at (404) 262-2376, or return this coupon.

MSA
THE FINANCIAL SOFTWARE COMPANY
Management Science America, Inc
3445 Peachtree Road NE, Dept C 1
Atlanta, Georgia 30326
(404) 262-2376

Chicago (312) 986-2450
Los Angeles (213) 822-9766
New York (201) 871-4700

International Agent
MSA International, Inc
Brussels, Belgium Tel (02) 673 99 63
Telex 63020 Answerback MSA B

Name
Company Title
Address
City State Zip
Phone Computer Model